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ABSTRACT

Findings are presented from a study designed to develop a physical education criterion reference test (CRT) and to devise norms for intellectually normal, educable mentally impaired, and trainable mentally impaired students (3-12 years old). The lack of valid and reliable CRT batteries for meeting the physical education needs of handicapped students is emphasized. Items for the CRT measuring fundamental motor skills and physical fitness were developed and administered to 279 normal, educable mentally impaired, and trainable mentally impaired students. The performance data were then used to construct normative tables across the three populations, and measures of reliability and content, descriptive, and criterion-selection validity were performed. Acceptable levels of validity and reliability were revealed. The CRT was designed for use in screening, determining eligibility, and providing input for placement and programing decisions. Data from performance results were used to develop student profiles, and analysis revealed significant differences in student performance on all 16 test items across the three student classifications. Extensive appendixes include the test manual. (CL)

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FINAL REPORT

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Grant Period: March 1, 1980 through February 28, 1981

EVALUATION AND REVISION OF A MOTOR SCREENING INSTRUMENT

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ABSTRACT

THE STANDARDIZATION OF A CRITERION-REFERENCED TEST IN FUNDAMENTAL MOTOR AND PHYSICAL FITNESS SKILLS

The objectives of this study were: 1) select and standardize criterion-referenced test items in the physical education psychomotor domain based on the definition in Public Law 94-142; and 2) develop a set of norms for intellectually normal, educable mentally impaired, and trainable mentally impaired children in the age range of 36 months to 155 months.

Three major test functions were identified to guide in the test development process. A test user is advised to administer the test to students for the following purposes:

1. Screening for the identification of children with specific needs in the fundamental motor and physical fitness skill areas;

2. Aid teachers, administrators, and parents in making special education eligibility decisions in the physical education content area; and

3. Aid teachers, administrators, and parents in making placement and instructional programming decisions to meet the unique needs of the student in physical education.

The sample used in this study was comprised of 279 students, ages 36 to 155 months with normal intelligence or classified according to Michigan's state definitions as educable mentally impaired or trainable mentally impaired.

Three criteria were developed for the selection of specific skills within the locomotor, object control, and physical fitness skill areas of the I CAN Objective Based Instructional System. The criteria represented an effort to select skills that were relevant to the physical education psychomotor domain being taught in schools throughout the United States. Sixteen skills were selected to be measured by the criterion-referenced test (CRT).

This study utilized three content experts to investigate (1) content validity, (2) descriptive validity, and (3) criterion-selection validity. Two aspects of reliability were evaluated. The first indice studied was the internal consistency of the test

using Cronbach's alpha coefficient and the second indice measured was the test-retest stability. The results obtained indicated excellent validity and reliability of the CRT.

The collection of student performance data was used as a field test under the same conditions in which it would be utilized. The initial analysis of the student performance data consisted of computing a three-way analysis of variance to test for differences between sex, age, student classification, and interaction effects.

Normative data were established by age and student classification. Student profiles were constructed to provide data to help in screening, placement, planning, and evaluating the instruction plan.

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I. INTRODUCTION

Background

In the 1970's significant changes in public policy on education of handicapped children are reflected in the provisions of Public Law 94-142, Education for All Handicapped Children Act, and court actions. The major thrust in current legislation is to provide a free, appropriate public education for all handicapped children. Two major provisions of the mandate, which are the specific concerns of the study, are the Individualized Education Program (IEP) and "Protection in Evaluation Procedures", non-discriminatory assessment and evaluation.

Public Law 94-142, the Education for All Handicapped Children Act of 1975, mandates assessment for three purposes: to determine eligibility for special education services, placement and instructional planning, and evaluating the effectiveness of the instructional plan. The mandate requires that state and local educational agencies shall ensure that assessment and evaluation procedures be nondiscriminatory. The rules and regulations (Federal Register, August 23, 1977) suggest the following minimum standards:

121a.532

(a) Tests and other evaluation materials:
(1) Are provided and administered in the child's native language or other mode of communication;
(2) Have been validated for the specific purpose for which they are used; and
(3) Are administered by trained personnel in conformance with the instructions provided by their producer;
(b) Tests and other evaluation materials include those tailored to assess specific areas of educational need and not merely those which are designed to provide a single general intelligence quotient;
(c) Tests are selected and administered so as best to ensure that when a test is administered to a child with impaired sensory, manual, or speaking skills, the test results accurately reflect the child's aptitude of achievement level or whatever other factors the test purports to measure, rather than reflecting the child's impaired sensory, manual, or speaking skills (except where those skills are the factors which the test purports to measure);
(d) No single procedure is used as the sole criterion for determining an appropriate educational program for a child;

(e) The evaluation is made by a multidisciplinary team or group of persons, including at least one teacher or other specialist with knowledge in the area of suspected disability; and

(f) The child is assessed in all areas related to the suspected disability, including, where appropriate, health, vision, hearing, social and emotional status, general intelligence, academic performance, communicative status, and motor abilities (p. 42496).

The Council for Exceptional Children (CEC) and researchers in physical education also have shown concern for adequate nondiscriminatory testing. The CEC (March 1977) established the following policy regarding nondiscriminatory evaluation:

Assessment instruments shall be appropriately adapted when used with children of impaired sensory, physical, or speaking skills and must consider each child's age and socioeconomic and cultural background.

Specialists implementing evaluation procedures must be familiar with local cultural, language, and social patterns and practices.

Tests and similar evaluation materials shall be administered in the child's primary language, wherever appropriate.

Interpreters, in the native language, and/or in sign language may be used throughout all phases of the evaluation.

All communication with parents and the child shall be in the native language of the home.

Local community norms shall be established when norm-referenced tests are used.

Criterion-referenced instruments should be used.

Developmental checklist(s) should be used where appropriate.

Instruments shall be administered only by trained personnel according to the producer's instructions.

Instruments shall assess specific abilities, not merely produce a single IQ score.

No one result shall determine placement (Exceptional Children, March 1977).

Public Law 94-142 was designed to ensure the availability to all handicapped children of a free, appropriate education. Appropriate placement and effective education of the handicapped are ensured by the section of the Act which provides that an individualized education program (IEP) be developed for each eligible handicapped child. The requirement for formalization of goals, objectives, and procedures for evaluation provides a management tool designed to ensure and facilitate delivery of appropriate special education and/or related services to meet the unique needs of the handicapped child.

Although specific information in the IEP will vary from student to student, the regulations outlined by PL 94-142 describe the following minimum components (Federal Register, August 23, 1977):

1. A statement of the child's present level of educational performance;

2. A statement of the annual goals, including short-term instructional objectives;

3. A statement of the specific special education and related services to be provided to the child, and the extent to which the child will be able to participate in regular educational programs;

4. The projected dates for initiation of services and the anticipated duration of the services;

5. Appropriate objective criteria and evaluation procedures; and

6. Schedules for determining, on at least an annual basis, whether the short-term instructional objectives are being achieved (p. 42491).

Currently, IEP's are written on approximately 155,000 students in the State of Michigan (Michigan Department of Education, 1977-1978). Projected across the United States, the figure increases to over six million. The need for appropriate, efficient assessment becomes readily apparent.

Teachers have stated the need for a means of assessing students to a) identify the presence of motor needs, b) determine eligiblity for placement in the least restrictive environment (LRE) continuum, and c) aid in planning appropriate instruction. The effectiveness of the entire process of individualized educational programming hinges upon accurate assessment. Unless a teacher can pinpoint exactly what a student needs to learn, and how he learns most successfully, any attempt at individualization

will fall far short of its intended goal. Assessment should be inseparable from instruction, characterizing teaching in a diagnostic-prescriptive way.

Review of current assessment instruments available to physical educators as to their conformance with the requirements of PL 94-142 and the Council for Exceptional Children shows tremendous need for revision and development of valid and reliable instrumentation in the physical education domain. Physical education is the only curricular area specifically addressed in PL 94-142 (Federal Register, August 23, 1977), and is defined as "Physical and motor fitness, fundamental motor skills and patterns, and skills in aquatics, dance and individual and group games and sports" (p. 42480). Authorities in the area of physical education for the handicapped (Cratty, 1975; Rarick, 1977, 1979; Wessel, 1980) have advocated development of valid and reliable assessment instruments for handicapped students. In the opinion of the same authorities, physical educators need to view assessment within the context of instructional placement and intervention. Also, assessment must be viewed clearly and simply as the process for collecting data for the purpose of making nondiscriminatory decisions about students using the guidelines provided by PL 94-142 and CEC.

At a study conference on research and demonstration needs in 1969, physical educators listed the following two major concerns related to assessment in physical education:

1. The development of diagnostic and evaluative instruments which would effectively measure the motor performance of young children as well as children at low functional levels; and

2. The development of new testing instruments which would hopefully remedy the practice of modifying existing tools or using instruments which were originally designed for other purposes (Loovis & Ersing, 1979).

On January 20, 1977, participants at the State of the Arts Conference on Adapted Physical Education in Mississippi expressed the following concerns:

1. The need for valid motor instrument methods;

2. The need for development of a motor assessment instrument to aid in determining proper placement of children; and

3. The necessity for assessments to aid in instructional planning.

On August 9, 1979 the National Consortium on Physical Education and Recreation for the Handicapped stated that there was a

priority need for the development and validation of motor assessment instruments.

Most existing instruments have the following limitations:

1. Only provide scores that are interpreted relative to a narrow, poorly described, student population;

2. Are limited in covering the scope of the motor domain;

3. Are not directly tied to curricular content;

4. Are inadequate for use with low-functioning students;

5. Are scored in a subjective manner causing low reliability estimates;

6. Are based entirely on a motor ability approach that identifies underlying strengths and weaknesses and has little research support (Salvia & Yesseldyke, 1978);

7. Are difficult to administer and interpret;

8. Provide inadequate data on validity and reliability; and

9. Measure only quantitative performance.

Assessment instruments and techniques must focus and emphasize eligibility, placement, and instructional planning decisions to meet the demands of teaching in compliance with PL 94-142.

The two major diagnostic assessment approaches used in the physical education domain to provide information for systematically making the decisions referred to above are motor abiiity and criterion-referenced tests. Motor ability testing is an approach which attempts to identify general student strengths and weaknesses which may underlie the learning of specific motor tasks (Vogel, 1977). General weaknesses, when remediated, are presumed to facilitate the mastery of more specific tasks included in most physical education curriculums. The criterion-referenced strategy deemphasizes assumed general abilities and emphasizes identifying the level (from a continuum of skill acquisition) a student has achieved on identified, educationally relevant tasks (Vogel, 1977). Instruction is designed to move the student to the next skill level.

Both assessment approaches can identify strengths and weaknesses. The major difference between the two approaches is the interpretation as to what the observed strengths and weaknesses represent.

In the criterion-referenced approach, the interpretation of identified strengths and weaknesses is restricted to an evaluation of the present level of performance on specific target skills. The next level of performance on the skill-learning continuum to be mastered and the behavioral components of that skill level become the emphasis of instruction.

Motor ability testing goes beyond observed performances and attempts to identify general abilities or deficiencies which may be the cause of obtained performance difficulties (Yesseldyke & Salvia, 1974). Instruction is then prescribed to remediate the general disabilities (e.g., coordination, balance) in hopes of improving specific, educationally relevant skills. Support for this testing and interpretation approach is weak in that:

1. There is an abundance of data suggesting that skill learning is specific rather than general (Clark & Shelley, 1961; Gallagher, 1970; Henry, 1956).

2. Most standardized general ability tests do not meet acceptable reliability standards (Yesseldyke & Salvia, 1974).

3. It offers the teacher little information related to the effective conduct of daily activities (Hofmeister, 1974).

Data obtained in the motor ability approach are interpreted by comparing student scores with a standardized norm group (norm-referenced). Data obtained in the criterion-referenced approach are interpreted relative to a predetermined criterion. The criterion can be in the form of qualitative and/or quantitative performance. On a criterion-referenced test (CRT), the teacher can report that some percentage of students can meet course objectives and interpret student status and progress on instructional content to be taught in the physical education program. Motor ability tests inadequately represent the physical education content domain and are not designed to pinpoint instructional content relevant to student status and progress on course objectives (Mann, 1971; Yesseldyke, 1973; Yesseldyke & Salvia, 1974).

Glaser (1963) proposed the concept of CRT's which emphasized establishment of an individual's performance level as it relates to performance along a continuum of skill acquisition. Criterion-referenced test interpretations are useful in content areas that are cumulative and progressively more complex for the student, such as physical education where students have to reach some minimal level of proficiency or mastery before proceeding to tasks that are more advanced. A student who cannot grasp a ball should not be given instruction on a mature catching pattern. Any content where mastery is required should incorporate CRT's on an ongoing basis to verify when a student reaches the defined acceptable level.

When making decisions concerning the appropriate placement of a student along the continuum of skill acquisition, educators would be best served by CRT's directly related to the content to be learned. The present level or entry level of performance on the skills selected for inclusion in the program should be evaluated to facilitate student achievement of the next higher performance level. In this manner, CRT's aid in meeting the unique needs of the student.

Criterion-referenced tests, directly linked to instructional content, allow for frequent evaluation of student progress which results in facilitating appropriate changes in the day-to-day prescription of instruction. Continuous monitoring of student progress via CRT's facilitates the communication to students, parents, and administrators, and provides important data necessary for updating IEP's.

Eligibility decisions are best made by interpretation of test results in a norm-referenced manner. A school can develop eligibility guidelines by comparing the performances of large groups of students and setting cutoff scores such as the tenth percentile or -2 standard deviations below the mean when compared to the norm group. A norm-referenced test interpretation will facilitate the identification of students that are grossly deficient in the physical education domain.

One approach to assessment is not necessarily better or worse than another. Each simply serves a different purpose.

Need for the Project

Currently there are no valid and reliable criterion-referenced test batteries available for meeting the assessment, instruction and/or placement needs for delivering services to handicapped or nonhandicapped students in appropriately designed (PL 94-142) physical education programs. The construction of a valid and reliable CRT would provide physical educators with much needed standardized instrumentation. The following major functions would be served with a motor performance CRT:

1. Screening for identification of children with motor needs by specifying strengths and weaknesses in comparison to the norm group;

2. Provide input to determine eligibility for special education services;

3. Provide input to determine appropriate placement in LRE;

4. Diagnostic and prescriptive programming when tied to instructional content;

5. Evaluation for monitoring progress and revising the educational plan.

The CRT must be referenced to relevant physical education program content as defined in PL 94-142. It therefore must include items representative of:

1. Fundamental motor skills and patterns;
2. Physical fitness;
3. Aquatics;
4. Dance; and
5. Individual and group games and sports.

It must be suitable for populations of handicapped and nonhandicapped students to best serve the screening functions and for determining appropriate placement in the LRE.

Objectives of the Project

The objectives of this study were: 1) select and standardize criterion-referenced test items in the physical education psychomotor domain based on the definition in Public Law 94-142; and 2) develop a set of norms appropriate for intellectually normal, educable mentally impaired, and trainable mentally impaired children in the age range of 36 months to 155 months.

Scope of the Project

The criterion-referenced test instrument was developed to assess fundamental motor skills and physical fitness, not the entire area specified by PL 94-142. The CRT items were constructed to assess the following three levels of qualitative performance: criterion, rudimentary, and assisted. The functional motor skill level was not considered in the development of the CRT. The criterion level was considered the essential prerequisite for students to progress to functional competence.

The sample used in this study was comprised of students ages 36 to 155 months with normal intelligence or classified according to Michigan's state definitions as educable mentally impaired or trainable mentally impaired. The students enrolled in regular classes were classified as normal, learning disabled, or emotionally impaired. The educable mentally impaired students were enrolled in self-contained classes in the regular neighborhood school building. All trainable students were enrolled in self-contained classes in intermediate school districts.

Three criteria were developed for the selection of specific skills within the locomotor, object control, and physical fitness skill areas. The criteria represented an effort to select skills

that were relevant to the physical education content being taught in Michigan school districts. Characteristics of well-designed CRT items were used as a guide in developing the test items (Popham, 1978b). The following steps were followed in the item development process:

1. Select objectives from two sources: a) I CAN Objective-Based Instructional System (Wessel, 1976), and b) Essential Performance Objectives for Physical Education in the State of Michigan (Michigan Department of Education, 1979 Draft);

2. List potential item components for each objective;

3. Rate components; and

4. Write items.

Subsequent to item development, three testers were trained to reliably administer the test by viewing videotaped performances of educable mentally impaired students performing the 16 test items. Following the completion of the training, the three testers collected performance data on 279 students classified as normal, educable mentally impaired, or trainable mentally impaired. The performance data were used to construct normative tables across the three populations of students.

The validity of the test items was evaluated by the use of content experts in the physical education domain. Reliability of all test items was measured by a test-retest procedure. The internal consistency of the test was measured by computing the coefficient alpha.

Limitations of the Study

1. Sample size was unequal within groups.

2. The small sample used to evaluate test-retest stability (n = 7) was selected based on the constraints of time and facilities that occur in all school environments.

3. The selection of observable qualitative components for the criterion level of performance for each test item was not a data-based decision. Selection was based on the judgment of three persons knowledgeable in motor skill development.

Terminology and Definitions

Amplified Objective: An expanded statement of an educational outcome which provides boundary specifications regarding testing situations, response alternatives, and criteria of correctness. Commonly used as a criterion-referenced test descriptive scheme that tells the user what the test is measuring.

Criterion-Referenced Test (CRT): A test designed to ascertain an individual's status on educationally relevant tasks. To interpret a test in a criterion-referenced manner is to pinpoint target skills and determine whether a student has or has not mastered the tasks to be learned. Standardized procedures can be developed and normative data can be collected that will increase the utility of the CRT.

Educable Mentally Impaired (Michigan Requirements): A student identified by an educational planning and placement committee, based upon a comprehensive evaluation by a school psychologist, certified psychologist, or certified consulting psychologist, and other pertinent information as having all the following behavioral characteristics:

1. Development of a rate approximately 2 to 3 standard deviations below the mean as determined through intellectual assessment;

2. Scores approximately within the lowest six percentiles on a standardized test in reading and arithmetic; and

3. Lack of development primarily in the cognitive domain.

Emotionally Impaired (Michigan Requirements): A student identified by an educational planning and placement committee, based upon a comprehensive evaluation by a school psychologist and social worker, a certified psychologist, a certified consulting psychologist, or a certified psychiatrist, and other pertinent information as having the following behavioral characteristic:

1. Disruptive to the learning process of other students or himself in the regular classroom over an extended period of time.

General Needs Assessment: The administration of a criterion-referenced test representing the selected content to be learned in the physical education program which will provide the teacher with information on the student's strengths and weaknesses relative to the program objectives.

Learning Disabled (Michigan Requirements): A student identified by an educational planning and placement committee, based upon a comprehensive evaluation by a school psychologist, or certified psychologist, or certified consulting psychologist, or an evaluation by a neurologist, or equivalent medical examiner qualified to evaluate neurological dysfunction and other pertinent information, as having all the following characteristics:

1. Disorder in one or more of the basic psychological processes involved in understanding or in using spoken

or written language, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculation;

2. Manifestation of symptoms characterized by diagnostic labels such as perceptual handicap, brain injury, minimal brain dysfunction, dyslexia, or aphasia;

3. Development at less than the expected rate of age group in the cognitive, affective, or psychomotor domains;

4. Inability to function in regular education without supportive special education services;

5. Unsatisfactory performance not found to be based on social, economic, and cultural background.

Motor Ability Test: A test designed to identify general or process strengths and weaknesses (e.g., balance, eye-hand coordination, that are presumed to cause inadequate motor skill development) in order to prescribe interventions designed to remediate ability weaknesses and/or facilitate strengths. Scores are interpreted relative to well-described norm groups in which students can be compared to one another.

Nondiscriminatory Evaluation Instruments: Testing and evaluation materials and procedures that are not racially and/or culturally discriminatory. Assessment with a single instrument, use of tests that are inappropriate for any of a variety of reasons, and testing by unqualified personnel are but a few of the practices that allow for discrimination to occur. Perhaps the major solution to the problem is to make as few indirect assessments and predictions as possible to proceed more directly to assessments in the domain of instruction. Teachers themselves might well do most of the assessing and put the results to use immediately in their day-to-day instruction by selecting or developing criterion-referenced tests that are representative of the content to be learned. At the same time, it would be necessary and beneficial to collect normative data on the criterion-referenced test on the local level to minimize discriminatory decision-making practices.

Objective-Based Instructional System (OBIS): An instructional program which systematically links instruction to assessed student needs on stated performance objectives by providing:

1. Clearly stated goals;

2. Goal-related objectives;

3. A program organization built upon the appropriate placement of objectives from preschool through secondary levels;

4. Objective-related instructional activities and games prescribed for students based on their changing needs; and

5. Objective-related student and program evaluation system.

Qualitative Performance Level: A mechanically mature movement pattern. The following four performance levels were used in the assessment of all 16 skills included in the criterion-referenced test:

1. Criterion level (C) - Student completes the item according to all the stated criteria. Any quantitative criteria stating "consecutive trials" require performance of all qualitative criteria the stated number of times.

2. Rudimentary level (R) - Student responds according to some of the criteria, but not all of the stated criteria (lacks quantitative or qualitative aspects).

3. Assisted level (A) - Student needs some form of physical assistance to respond, such as manipulating the student, guiding a student's hand or tapping of student's limb. Through physical assistance, the student can perform a minimum of one qualitative criterion.

4. Other level (O) - Student does not respond, responds inappropriately, resists assistance, or cannot perform a minimum of one qualitative criterion with physical assistance.

Screening and Referral: A systematic process for determining the range of variability within a class or age level by comparing a student with established standardized test scores. A teacher can identify those students that are in the lowest portion of the range and refer them for a more in-depth evaluation in physical education.

Standardized Test: A test designed to measure a sample of individual performance, administered according to uniform procedures, scored in conformance with uniform rules, and interpreted in reference to certain normative information and/or specific instructional content. Data on reliability and validity of the test must be provided.

Trainable Mentally Imparied (Michigan Requirements): A student identified by an educational planning and placement committee based upon a comprehensive evaluation by a school psychologist, certified psychologist, or certified consulting psychologist, and other pertinent information as having all the following behavioral characteristics:

1. Development at a rate approximately 3 to 4.5 standard deviations below the mean as determined through intellectual assessment;

2. Lack of development primarily in the cognitive domain;

3. Unsatisfactory school performance not found to be based on student's social, economic, and cultural background.

Project Management Plan

The project activities to be conducted by quarters to achieve the project objectives are presented below in outline form.

Quarter	Task	Evidence of Achievement
1	1. To assemble all test items from the I CAN curriculum that represent the fundamental motor skill component and the health fitness component.	1.1 List of all test items by component.
1	2. Develop training videotape of students performing all test items.	2.1 Training on videotape on file.
1	3. Train five testers to collect performance data.	3.1 List of trained testers. 3.2 Documentation of training session(s): dates, sites, testers in attendance and procedures and date when mastery was achieved.
1	4. Identify potential test sites.	4.1 List of test sites. 4.2 Letters of agreement on file.
1	5. Identify content experts.	5.1 List of 5 content experts. 5.2 Letters of agreement on file.
1	6. Identify all possible subcomponents in the motor domain.	6.1 List of subcomponents.

Quarter		Task		Evidence of Achievement
1	7.	Develop matrix by test item and submotor component for content expert review.	7.1	Matrix developed.
1	8.	Select three expert raters from staff of trainers.	8.1	List of 3 expert raters.
			8.2	Letters of agreement on file.
2	1.	Content experts evaluate all test items for content validity in fundamental motor skills and health fitness.	1.1	Completed content validity forms and data on file.
2	2.	Content experts judge to what degree each test item measures any submotor component.	2.1	Completed data matrix for each content expert on file.
2	3.	Expert raters rate 10 students' performance on all test items via videotape.	3.1	Completed rating forms with performance data on file.
3	1.	Collect student performance data on all test items.	1.1	Performance data recorded and on file.
3	2.	Trainees rate 10 students' performance on all test items via videotape.	2.1	Completed rating forms with performance data on file.
4	1.	Analyze student performance data to determine predictor test items for fundamental motor skills and health fitness.	1.1	List of predictor test items by fundamental motor skills and health fitness.
4	2.	Compute amount of agreement between trainees (inter-rater).	2.1	Kappa (K) statistic calculated for expert raters (objectivity).
4	3.	Compute amount of agreement between trainees (inter-rater).	3.1	Kappa (K) statistic calculated for total group of raters.

Quarter		Task	Evidence of Achievement
4	4.	Compare amount of agreement between expert raters and trainee raters.	4.1 Kappa (K) statistic calculated for total group of raters.
4	5.	Trainee raters will reassess the same 10 students' performance after a two-week interval via videotape.	5.1 Reassessment data for 10 students on file.
4	6.	Compute Pearson product moment correlation coefficient for reliability of trainee reassessment.	6.1 Reliability coefficient on file.
4	7.	Separate performance data into three groups (normal students, educable students, and trainable students) and compare the group means and standard deviations for each group across ages.	7.1 Three separate records of data. 7.2 Three group means and standard deviations recorded.
4	8.	Compare findings with those of other researchers (Rarick, et al.).	8.1 Comparison of findings on file and in final report.
4	9.	Recommend revisions in the motor assessment screening instrument based upon content validity, item reduction analysis, objectivity, reliability and appropriateness data.	9.1 List of recommendations on file.
4	10.	Report and disseminate the results of the project.	10.1 Final report submitted. 10.2 Report results at professional conferences and submit to professional journals.

II. METHODS AND PROCEDURES

The objectives of this study were: 1) develop standardized criterion-referenced test items in the physical education psychomotor domain and 2) develop a set of norms for intellectually normal, educable mentally impaired, and trainable mentally impaired children in the age range of 36 months to 155 months.

Design Overview

The first objective of this study was reached by following a six-step process. First, the developer had to decide what functions the items would serve. Second, objectives had to be developed or selected from the previously constructed I CAN Objective-Based Instructional Programs. Third, criterion-referenced test items for newly developed objectives had to be designed to measure the objectives. Fourth, directions for administering and scoring each test item had to be developed. Fifth, data had to be collected on the validity of the test items; and last, reliability of the test items had to be evaluated.

Functions of the Test

The following functions will be served by this standardized CRT:

1. Screening for identification of children with motor needs by specifying strengths and weaknesses in comparison to each child's norm group;

2. Provide input to determine eligibility for special education services in physical education; and

3. Instructional assessment to aid in decisions regarding appropriate placement and instructional programming to meet the unique needs of the student in physical education.

The above three purposes were used as a guide in the test-development process. Any decisions that were made during this process were made relative to their impact on meeting these purposes.

Selection of Objectives

If the above functions of the test were to be met, it was necessary to develop or select objectives that were representative of physical education skills most commonly taught in schools throughout the United States.

Fundamental motor skills and physical fitness skills were selected as being representative of skill areas most commonly taught to students in the age range of 3 to 12. These two skill areas also were specifically selected from the definition of physical education in Public Law 94-142. Three criteria were used during the selection of specific skills within each of the two skill areas. These criteria represented another effort to maximize the selection of skills most commonly taught in Michigan schools. It was assumed that Michigan was representative of most states. The criteria used were:

1. The skill had to be listed as an essential performance objective in physical education in the State of Michigan within the object control, locomotor, or physical fitness skill areas (Michigan Department of Education, 1979 draft);

2. The skill had to be a program objective in the I CAN Objective-Based Instructional System within the object control, locomotor, or physical fitness skill areas (Wessel, 1976); and

3. The skill had to be determined as content valid by surveying selected physical education literature.

Subsequent to specific skill selection, amplified objectives were developed from the program objectives contained in the I CAN Objective-Based Physical Education System (Wessel, 1976) and the Essential Performance Objectives for Physical Education in the State of Michigan (Michigan Department of Education, 1979 draft). The amplified objective for each specific skill was used as the test item's descriptive scheme to guide in the CRT item construction. A descriptive scheme constitutes the "criterion" to which the test is "referenced". It provides a clear description of the behaviors that the student can or cannot perform. The major purpose of the descriptive scheme is to communicate to the test user what it is that the test is measuring. The amplified objectives may be found in Appendix A.

Criterion-Referenced Test Items

The following two characteristics of well-designed CRT items were used as a guide in developing the test items (Popham, 1978b):

1. An established descriptive scheme in the form of an amplified behavioral objective; and

2. A sufficiently limited focus on those behaviors that are judged to be the most relevant and observable in the everyday physical education class.

The major task in item development following the specification of amplified objectives was to determine which behaviors were relevant and observable. This task was accomplished by 1) listing the most common qualitative components of each of the selected fundamental motor skills and physical fitness skills, 2) selecting three content experts, and 3) having each content expert rate each qualitative skill component for a) ease of observability in the physical education setting, and b) its compatibility with the research that describes a quality performance. Those qualitative components that received a negative rating on observability and/or compatibility by two or more raters were deleted. Those components that survived the selection process were placed in the criterion level of each test item. It is important to note that the selection of observable behaviors was not a data-based decision.

Standardization of Directions for Administration and Scoring

During the development of standard directions for administration of each CRT item it was necessary to keep in mind the requirements of Public Law 94-142 with regard to nondiscriminatory evaluation practices. The following five stimulus attributes were used in the directions for administering each test item in an attempt to minimize any discriminatory practices:

1. Preceded by a demonstration and verbal request;

2. Two practice trials to assure that the student understands what to do;

3. One additional demonstration is provided where the student does not know what to do on the first trial;

4. Instructions are provided in the student's native language or mode of communication (e.g., sign language).

Four response alternatives were used in an attempt to include the majority of possible performance levels that might exist when assessing normal, educable mentally impaired, and trainable mentally impaired students in the age range of 3 through 12 years. The following response alternatives represent a range of performance from no ability to a quality pattern:

1. Criterion level (C) - Student completes the item according to all the stated criteria. Any quantitative criteria stating "consecutive trials" require performance of all qualitative criteria the stated number of times.

2. Rudimentary level (R) - Student responds according to some of the criteria, but not all of the criteria (lacks quantitative or qualitative aspects).

3. Assisted level (A) - Student needs some form of physical assistance to respond, such as manipulating the student, guiding a student's hand or tapping the student's limb. Through physical assistance the student can perform a minimum of one qualitative criterion.

4. Other level (O) - Student does not respond, responds inappropriately, resists assistance, or cannot perform a minimum of one qualitative criterion with physical assistance.

Validity of the Test Items

Three content experts were utilized in this study. These experts investigated 1) content validity, 2) descriptive validity, and 3) criterion-selection validity. Based on the purpose of the investigation, the criteria for selection of these experts included:

1. A minimum of 18 credits in motor development beyond the master's degree;

2. A minimum of three years experience in teaching physical education skills to children or youth; and

3. A minimum of three years experience in observing and assessing the qualitative motor performance of children or youth.

These criteria were used to help ensure the view of persons knowledgeable in the systematic study of motor development and the practitioner.

Content Validity: Two aspects of content validity were investigated:

1. The degree to which the objectives represent the fundamental motor skill (locomotor and object control skills) and physical fitness skill domains; and

2. The degree to which the objectives represent the following factors (subareas) identified in most motor ability studies of normal, educable mentally retarded and trainable mentally retarded children:
   (a) Balance
   (b) Flexibility
   (c) Limb-eye coordination
   (d) Leg power
   (e) Upper body strength

Content validity was measured by having the three experts read a clear description of each skill selected for the study. Their task was to independently mark an "X" in the appropriate

cell if they felt that the objective (skill) was representative of that particular domain and/or subarea. If they felt the objective was not representative of a specific domain or subarea, they were asked to mark an "O" in the space provided. The percentage of agreement among raters was calculated and used as the measure of content validity. A percentage of .90 was used as an indicator of satisfactory content validity (Popham, 1976). Where a .90 percentage of agreement was not reached, a discussion session was encouraged. At this time, each rater was asked to provide a rationale for his/her rating. Following the discussion, the content experts were asked to rerate the content validity. A .67 percentage of agreement was used for the rerating of content validity.

Descriptive Validity: Descriptive validity was measured by judging the item-objective congruency. Item-objective congruency was defined as "the ability of a test item to measure a specific objective." The same content experts were first asked to read the "amplified behavioral objectives" that constitute the CRT specifications and then read the test items. Each rater was then requested to judge on an item-by-item basis whether the item was congruent with its objective. The following rating described by Kosecoff et. al. (1976), Martuza (1977), and Popham (1978a) was utilized.

+1 - if the item was definitely congruent with its objective;

0 - if the rater was not sure of the congruency; or

-1 - if the item was definitely not congruent with its objective.

Following the independent ratings, the responses were tallied and the index of item-objective congruency was calculated. This computation was the mean score obtained for each item. An item had to receive an index of +1 to be accepted as having descriptive validity. Those items that received less than +1 were redesigned until a +1 was reached.

Criterion or Domain-Selection Validity: Two aspects of criterion validity were measured: 1) whether the components of the criterion level of each test item were compatible with what experts consider a quality pattern, and 2) whether the components of the criterion level could be reliably observed in the physical education class. Each content expert was given a copy of the components selected for the criterion level of each item. The raters were requested to independently rate each item by placing an "X" in the appropriate space if the component was compatible and another "X" in the appropriate space if the component was observable by teachers in the physical education class. If a rater gave a component an "O", meaning it was not compatible or

was not observable, the raters were asked to write a rationale for their decision. The written rationales were reviewed to make any potential changes in item content.

It was anticipated that minor discrepancies would exist and be tolerated due to the fact that the test developer was looking for a compromise among 1) what content authorities consider the components of a quality pattern, 2) what components could reliably be observed in physical education class, and 3) administrative utility (as few components as necessary). As could be expected, some were willing to compromise more than others. Those components receiving two or more "0's" were deleted or revised based on the rationale provided.

Reliability

The two reliability measures investigated in this study were: 1) internal consistency and 2) test-retest stability. The internal consistency of the CRT was measured by calculating Cronbach's (1951) alpha coefficient. According to Ebel (1979), a coefficient of .80 or higher is acceptable. The standard used in this study was .85.

The test-retest procedure was used to measure the stability of the decision-making process. An available sample of educable mentally impaired students (N = 7) were administered the test (16 items) on a Friday morning by three independent raters. Two weeks later the same three raters readministered the same test. A Pearson product-moment correlation was calculated on the two groups of test scores with a .90 coefficient used as a standard of acceptable test stability. Failure to get a .90 coefficient due to inadequate variability in test scores would result in the calculation of one of the newer methods of determining CRT reliability. Live performance ratings (as contrasted to videotaped) were used to get a more realistic reliability measure similar to the physical education class.

Student Performance Data

To meet the functions of the test, namely, 1) screening, 2) determining eligibility for special education services in physical education, and 3) instructional assessment for placement and programming, it was necessary to collect student performance data (norms) to which scores could be referenced.

Training the Testers: Three testers were employed to collect student performance data. Two of the testers were master's degree students in physical education. The other tester was a doctoral student in physical education for the handicapped. The three testers were given a copy of the test and administration manual for their review. The testers were trained through repetition and practice over a one-week period of time by administering each test item to each other and to several available children.

Establishing the Performance Standards: A videotape of a representative sample of students available from the Lansing School District was developed. Students were selected who represented all skill levels on the motor skill test items. The researcher administered standard procedures for each test item while a technician videotaped three trials per test item. The following standard test administration procedures were used:

1. Use equipment specified in the criterion-referenced test description;

2. A verbal request in the child's native language and a demonstration of the skill;

3. Three trials per student;

4. A physical prompt when the student failed to perform at a rudimentary level (R) in the first two trials.

Three expert raters were employed to rate the training videotape. The expert raters were selected on the following criteria:

1. A minimum of two years of teaching physical education to children or youth in a school or clinical setting;

2. A minimum of two years experience assessing the qualitative motor performance of children or youth; and

3. A minimum of a master's degree in physical education.

The raters were given an opportunity to study the test items prior to rating the videotape. They were asked to rate the performance of all the children on all the items as a group, rather than an independent rating. They were encouraged to discuss any discrepancies and allowed to replay the tape as many times as needed. The final performance ratings were used as the standard to train the three testers.

Prior to any formal data collection, each tester had to meet a 1.0 level of mastery when compared to the expert ratings (performance standards) on the videotape for each student and item. Subsequent to reaching the mandatory level of assessment accuracy, the testers evaluated the motor performance of 279 children.

Sampling Design: A 2x10x3 fixed effects research design was employed in this study. There were 60 possible levels across the three independent variables. The sampling technique required that each of the 60 cells have a minimum of three subjects which would result in 180 total. Several schools would not allow students to be sampled from classes but insisted that all students in a given class be used. This resulted in a total sample size of 279.

Subsequent to reaching the mandatory level of assessment accuracy, student performance data were collected on a stratified sample (N = 279) of normal, learning disabled and emotionally impaired students placed in the regular physical education program (N = 117), educable mentally impaired students placed in special classes in the regular neighborhood school (N = 96), and trainable mentally impaired students placed in special classes in intermediate school districts (N = 66).

The age range of the sample was 36 months to 155 months with sample sizes by age including: 3-year-olds (N = 18), 4-year-olds (N = 21), 5-year-olds (N = 29), 6-year-olds (N = 29), 7-year-olds (N = 33), 8-year-olds (N = 39), 9-year-olds (N = 46), 10-year-olds (N = 26), 11-year-olds (N = 21), 12-year-olds (N = 17). The sample was also stratified by sex: females (N = 134) and males (N = 145). The purpose of stratifying the sample was to assure representation of various groups in at least minimum proportions.

Each tester administered all test items on an individual basis. The tester was responsible for completing a score sheet for each student with the necessary information concerning subject's name, age, sex, classification (normal, educable, trainable), date, test administrator's name, and starting and ending times. The data concerning age and classification were obtained from the student's teacher. Following the completion of the daily assessment activity, a code number was substituted for the student's name.

Analysis of the Student Performance Data: The student performance data were initially analyzed by computing a three-way analysis of variance to test for a significant interaction effect. If an interaction effect was significant, the means were plotted to determine if it was ordinal or disordinal. Where disordinal interaction was present, the main effects were tested. If main effects were significant, the Tukey Multiple Range Test was conducted. If the interaction was not significant, the main effects were evaluated.

The next level of analysis consisted of computing item percentiles (cumulative). Subtotal and total test score cumulative percentiles were then constructed. The final level of analysis was to compute the mean and standard deviation for each item, subtotal, and total test score to aid in the construction of student performance profiles.

Test Score Interpretations: Subsequent to student performance data analysis, guidelines for making special education eligibility and placement decisions were developed. The guidelines were based on the construction of student performance profiles. These profiles were developed by using the mean and standard deviation data available for each item, subtotal score, and total test score by age and classification.

It would be realistic for a school district to provide special education services in physical education to a child that performs consistently below the mean on fundamental motor skills and/or physical fitness skills. If a student performs 2 or 3 standard deviations below the mean in one particular skill area, it might be realistic to place that student in an adapted physical education class or provide more physical education classes until the student reaches an acceptable level. A trainable mentally impaired student that performs as well as normal students should realistically be placed in the regular physical education class. These and other decisions will be aided by consulting the student performance profiles.

III. RESULTS AND DISCUSSION

This chapter presents the findings under the two major sections, with eight subsections. These include:

1. Standardization of criterion-referenced test items.
   (a) Determining the functions to be served by the test;
   (b) Selecting objectives to be measured by the test item;
   (c) Development of criterion-referenced test items to measure the selected objectives;
   (d) Standardizing the directions for administration and scoring of each test item;
   (e) Evaluating the validity of the test;
   (f) Evaluating the reliability of the test.

2. Developing a set of norms.
   (a) Collecting student performance data;
   (b) Developing guidelines for test score interpretation.

Standardization of Criterion-Referenced Test Items

The Functions of the Test: Three major test functions were identified to guide in the test development process. Any subsequent decisions that were made based on their impact on these functions.

Selection of Objectives: Fundamental motor skills and physical fitness skills were selected as being representative of the Public Law 94-142 definition of physical education and of skill areas most commonly taught to students in the age range of 3 through 12.

Figure 1 presents the fundamental motor skills and Figure 2 presents the physical fitness skills that were selected to be used in the CRT.

Development of the Criterion-Referenced Test Items: The major task in CRT item development was to determine which qualitative behaviors would be used in each test item. Those qualitative components listed in Appendix B were placed on a rating form and evaluated for 1) their observability in a physical education class, and 2) their consistency with what research described as a mature pattern. Three content experts were used in this rating and the subsequent result was a sufficiently limited focus on relevant and observable behaviors. Figure 3 presents a summary of those specific qualitative components selected to represent each skill. Appendix B provides the content expert ratings for each qualitative component.

	Crabty (1976,1979)	Dauer (1971)	Espenshade and Eckert (1967)	I CAN Instructional System (1976)	Ohio State Sigma (1979)	Seefeldt and Haubenstricker (1972-1976)	State of Michigan Minimal Perf. Obj. (1979)	Wickstrom (1977)	Frequency	Meets Selection Criteria
Climb			X		X				2	
Gallop	X	X	X	X		X	X		6	X
Hop	X	X	X	X	X	X	X		7	X
Horizontal Jump	X	X	X	X	X	X	X	X	8	X
Leap		X		X			X		3	X
Run	X	X	X	X	X	X	X	X	8	X
Skip	X	X	X	X	X	X	X		7	X
Slide		X		X			X		3	X
Walk	X	X	X	X	X	X		X	7	
Backhand Strike				X			X		2	
Bounce			X	X			X		3	X
Catch	X	X	X	X	X	X	X	X	8	X
Forehand Strike				X			X		2	
Kick		X	X	X	X	X	X	X	7	X
Overhand Strike				X						
Overhand Throw	X	X	X	X	X	X	X	X	8	X
Punt						X	X		2	
Side-Arm Strike		X	X	X	X	X	X	X	7	X
Underhand Roll				X			X		2	
Underhand Strike				X					1	
Underhand Throw				X			X		2	

Figure 1. Fundamental motor skill selection checklist.

	AAHPER Special Fitness Test for Mildly Mentally Retarded Persons (1976)	Daur (1971)	Fait (1972)	Hunsicker & Reiff (1976)	I CAN (Wessel, 1976)	State of Michigan Minimal Performance Obj. (1979)	Safrit (1981)	Sharkey (1979)	Frequency	Meet Selection Criteria
Abdominal Strength	X	X		X	X	X	X	X	7	X
Agility	X	X	X	X				X	5	
Arm & Shoulder Strength	X	X	X	X	X	X		X	7	X
Balance		X	X					X	3	
Cardiorespiratory Endurance	X		X	X	X	X	X	X	7	X
Explosive Muscular Power	X	X		X				X	4	
Flexibility		X			X	X	X	X	5	X
Relaxation					X				1	
Speed		X	X	X				X	4	
Weight Maintenance					X				1	

Figure 2. Physical fitness skill selection checklist

Run

A period when both feet are off the floor.
Arms move in opposition to legs, elbows bent.
Toe-heel or heel-toe foot contact.

Gallop

Brief periods where both feet are off the floor.
Trailing foot does not cross in front of lead foot at floor contact.

Hop

Carriage of nonsupport leg is slightly bent.
Maintain upright body position, elbows bent.
Arms swing forward and upward.

Skip

A step-hop pattern of alternate feet.
Arms move in opposition to legs and are slightly bent.

Horizontal Jump

Take off and land on two feet.
Arms thrust during take off with full extension of legs.

Slide

Period when both feet are off the floor and remain parallel.
Weight transfer from trail foot to lead foot along a straight line to the side.

Leap

Take off on one foot, balanced landing on the other foot.
Forward reach with arm opposite lead foot.

Overhand Throw

Downward arc of throwing arm to initiate throw.
Hip and trunk rotation.
Weight transfer to foot opposite throwing arm.
Follow through well beyond ball release.

Catch

Hands in front of body, elbows bent.
Extension of arms in preparation for ball contact.
Contact and control ball with hands only.

Stationary Bounce

Contact the ball between thighs and waist.
Push ball with fingers of one hand only.
Maintain a stable stationary position.

Figure 3. A summary of specific qualitative components selected to represent each skill.

Kick

A preliminary forward leap on the non-kicking leg.
Foot placement next to the ball.
A single continuous kicking motion.

Push-Ups

Assume a prone position parallel to floor, toes on floor, hands directly under shoulders.
Keep body parallel to floor while lowering body to 1-3" above floor.
Raise body to starting position.

Two-Hand Strike

Side orientation toward desired direction of travel.
Hip and spine rotation during swing.
Weight transfer onto front foor during swing.

Run/Walk

Run or walk continuously.
Five consecutive minutes.

Sit-Ups

Lie on back, knees bent, feet flat on floor, arms crossed over chest.
Curl up to touch elbows to thighs.
Return to lying position.

Sit and Reach

Assume a sitting position with legs together and knees straight.
Bend and reach forward to feet with one hand on top of the other.
Keep legs straight.
Hold position for 3 seconds.

Figure 3 Continued.

Subsequent to skill selection and the determination of the specific qualitative behaviors for each selected skill, amplified objectives were developed from the program objectives contained in the I CAN Objective-Based Physical Education System (Wessel, 1976) and the Essential Performance Objectives for Physical Education in the State of Michigan (Michigan Department of Education, 1979 draft). The amplified objective for each skill can be found in Appendix A.

It is important to note that the I CAN format of including the qualitative behavior, "smooth, rhythmical pattern", is assumed in each of the amplified objectives. The rationale for this assumption is based on teachers' comments concerning students that learn a skill by learning one qualitative behavior at a time. The final product of their performance sometimes looks mechanical in form because they have not mastered a smooth rhythmical sequence of the components.

A quantitative behavior component was also included in each amplified objective as a standard for mastery. In most objectives, the student was required to perform the specific skill three consecutive trials before mastery was achieved. In certain cases it was more appropriate to use a distance standard such as 50 feet.

Standardizing the Directions for Administration and Scoring of Each Test Item: The most important factor in the development of standard directions was the requirement of Public Law 94-142 concerning nondiscriminatory evaluation practices. Four stimulus attributes were included in the directions for each test item administration in an attempt to maximize any discriminatory practices.

To allow for a range of performance levels that would be expected from normal, educable, and trainable students in the age range of 3 through 12 years, four response alternatives were used in each test item.

The revised test manual with test items, directions for administration, scoring, and interpretations will be available from the Field Service Unit, Michigan State University.

Validity of the Criterion-Referenced Test Items: This study utilized three content experts to investigate (1) content validity, (2) descriptive validity, and (3) criterion-selection validity.

Content Validity. Two aspects of content validity were studied:

1. The degree to which the objectives represent the fundamental motor skill (locomotor and object control skills), and physical fitness skill domains; and

2. The degree to which the objectives represent the following factors (subareas) identified in most motor ability studies of normal, educable mentally retarded and trainable mentally retarded children:
   (a) Balance
   (b) Flexibility
   (c) Limb-eye coordination
   (d) Leg power
   (e) Upper body strength

The three content experts independently rated all 16 skill objectives relative to the above two aspects of content validity. A 97.6% of agreement was obtained from the three raters across all skills. Table 1 provides a summary of ratings (n = 3 raters) for content validity.

Descriptive Validity. This form of validity was measured by having three content experts judge the CRT item-objective congruency. The judges were required to rate the ability of the test item to measure its amplified objective. All 16 test items received a +1 rating, meaning that, in the opinion of the content experts, all test items measured the objective that they were designed to measure. Table 2 presents a summary of the descriptive validity ratings (n = 3 raters). According to these results, the test items had excellent descriptive validity.

Criterion-Selection Validity. This form of validity was evaluated by having three content experts rate the components selected for each test item on (1) their observability in the physical education class and (2) their consistency with what research describes as a mature pattern. All components used in the 16 test items received at least two "X`s" on their observability and consistency (an "X" denoting a positive rating), resulting in acceptable criterion validity. Complete criterion validity ratings can be found in Appendix C.

According to these results, the test has adequate validity.

Reliability of the Test Items: Two aspects of reliability were evaluated in this section of the study. The first measure studied was the internal consistency of the test. This was evaluated by calculating Cronbach`s (1951) alpha coefficient for 279 students across all 16 test items. An alpha coefficient of .92 was obtained resulting in acceptance of inter-item homogeneity.

The second aspect of reliability studied was the test-retest stability. Three raters independently assessed an available sample of seven educable mentally impaired students on all 16 test items. This means that a total of 336 units of data were collected. Exactly two weeks later the same three raters readministered the same 16 test items to the same students. A Pearson product-moment correlation was calculated on the two groups of test scores. A correlation coefficient of .97 was

Table 1
A Summary of Ratings for Content Validity

	DOMAINS						SUBAREAS									
	LOCOMOTOR SKILL		OBJECT CONTROL SKILL		PHYSICAL FITNESS SKILL		BALANCE		FLEXIBILITY		LEG POWER		LIMB-EYE COORDINATION		UPPER BODY STRENGTH	
OBJECTIVES	X[a]	O[b]	X	O	X	O	X	O	X	O	X	O	X	O	X	O
GALLOP	3			3		3		3		3		3		3		3
HOP	3			3		3	3			3	3			3		3
HORIZONTAL JUMP	3			3		3	2	1		3	3			3	1	2
LEAP	3			3		3	3			3	3			3		3
RUN	3			3		3		3		3		3		3		3
SKIP	3			3		3	3			3		3		3		3
SLIDE	3			3		3	1	2		3		3		3		3
BOUNCE		3	3			3		3		3		3	3			3
CATCH		3	3			3		3		3		3	3			3
KICK		3	3			3	3			3	3		3			3
OVERHAND THROW		3	3			3		3		3		3		3	3	
SIDEARM STRIKE		3	3			3		3		3		3	3			3
SIT-UPS		3		3	3			3	3			3		3		3
PUSH-UPS		3		3	3			3		3		3		3	3	
RUN/WALK	3			3	3			3		3		3		3		3
SIT AND REACH		3		3	3			3	3			3		3		3
	8		5		4		5		2		4		4		2	

[a]The Objective is a measure of that domain or subarea.
[b]The Objective is not a measure of that domain or subarea.

Table 2

A Summary of Descriptive Validity Ratings

Objective	Rater		
	1	2	3
Run	+1	+1	+1
Gallop	+1	+1	+1
Hop	+1	+1	+1
Skip	+1	+1	+1
Horizontal Jump	+1	+1	+1
Slide	+1	+1	+1
Leap	+1	+1	+1
Abdominal Strength	+1	+1	+1
Overhand Throw	+1	+1	+1
Trunk and Leg Flexibility	+1	+1	+1
Catch	+1	+1	+1
Bounce	+1	+1	+1
Arm and Shoulder	+1	+1	+1
Kick	+1	+1	+1
Two-Hand Strike	+1	+1	+1
Cardiorespiratory Endurance	+1	+1	+1

Note: A +1 was used to denote in item that was definitely congruent with its objective.

obtained. This high correlation between test and retest data is not extremely surprising in light of the attempt to validate qualitative behaviors that were observable in the physical education class. These behaviors that were rated "difficult to observe" were deleted from the test items. It is important to note that the student's test scores did not change significantly due to vagueness of test instructions, variations in testing conditions or other irrelevant factors that are common in the field. Most of these conditions can be controlled through the use of videotapes but, to keep the situation as realistic as possible, live performances were analyzed.

Based on the above results, Cohen's kappa statistic was not needed. Mehrens (1980) and Ebel (1980) believe that using the traditional strategies of correlation coefficients is fine as long as high coefficients are obtained.

Normative Data

Analysis of the Student Performance Data

Initial analysis of the data consisted of computing a three-way analysis of variance to test for an interaction between sex, age, and student classification. The run test item resulted in a significant (.007) disordinal effect for age by student classification. The gallop test item resulted in a significant (.026) disordinal interaction for age by student classification. The horizontal jump test item resulted in a significant (.003) disordinal interaction for sex by age by student classification and also for age by student classification (.037). The leap test item resulted in a significant (.014) disordinal interaction for sex by student classification. There was no significant interaction for any of the five object control skill test items. The sit and reach test item resulted in a significant disordinal interaction (.002) for sex by age by student classification.

Subsequent to the initial data analysis, the main effects of sex, age, and student classification were evaluated. Table 3 shows that the only two test items that resulted in significant differences across sex were the overhand throw and the two-hand strike. Tables 1 through 19 show that all 12 fundamental motor skill test items resulted in significant main effects for age (3-12), while none of the physical fitness test items resulted in significant age effects.

Significant main effects resulted for all 16 test items across the three student classifications (normal, educable mentally impaired, and trainable mentally impaired). Tables 20 through 35 present a summary of the analysis of variance for student classification differences on each test item.

Table 3

Mean Standard Deviation and F Ratio
for Sex Differences on Each Test Item

Item	Sex	M	SD	F
Run	M	3.37	.75	.75
	F	3.30	.67	
Gallop	M	3.08	.88	1.59
	F	3.22	.87	
Hop	M	3.10	.96	.01
	F	3.11	1.06	
Skip	M	2.66	1.08	1.58
	F	2.83	1.13	
H. Jump	M	3.24	.85	.02
	F	3.25	.74	
Slide	M	2.92	.89	.18
	F	2.97	.95	
Leap	M	2.31	.98	.01
	F	2.30	1.06	
O. Throw	M	3.19	.75	9.30[a]
	F	2.94	.59	
Catch	M	3.12	.80	4.08
	F	2.93	.79	
Stationary Bounce	M	3.12	.85	1.43
	F	3.00	.80	
Kick	M	3.15	.57	3.95
	F	3.02	.51	
Two-Hand Strike	M	3.27	.65	26.12[a]
	F	2.90	.57	
Sit-ups	M	3.11	.72	.01
	F	3.10	.66	
Sit and Reach	M	3.22	.58	1.20
	F	3.30	.60	
Push-ups	M	2.79	.92	5.03
	F	2.47	.79	
Run/Walk	M	3.69	.76	.07
	F	3.66	.78	

[a]Significant at .01 level.

Where significant main effects were realized, the Tukey Multiple Range Test was conducted to pinpoint exactly where the significance was located. Tables 36 through 63 provide data on the results of the Tukey test for age and student classification differences. In 10 of the test items, neither of the three student classifications resulted in homogeneous student performances. Six of the test items (overhand throw, stationary bounce, kick, two-hand strike, sit and reach, and run/walk) had homogeneous student performance in some combination relative to student classification. Those test items that resulted in homogeneous performance relative to student classification were pooled for the purpose of student profile development.

The next phase of student performance data analysis was the development of cumulative percentiles by age and student classification for each student performance level (criterion, rudimentary, assisted, and other). Tables 64 through 79 present the cumulative percentiles for each test item. It is important to remember that the physical fitness test items were administered only to students 8 years old and above. Table 80 presents a summary of ages at which the criterion level of performance first appeared for each student classification on each test item. Table 81 presents a summary of ages at which the criterion level of performance was mastered by 25%, 50%, and 75% or more of the students in each of the student classification samples.

The final phase of student performance data analysis resulted in the formulation of student profiles for ease of teacher interpretation. The mean and standard deviation for each test item, subtotal score (locomotor skills, object control skills, and physical fitness skills), and total test score was calculated by age and student classification. Table 82 provides the mean and standard deviation for all seven locomotor skill test items and subtotal by age and student classification. Table 83 presents the mean and standard deviation for each of the five object control skill test items along with the object control skill subtotal and total fundamental motor skill test score (combines both locomotor and object control skills). Table 84 presents the mean and standard deviation for each of the four phsycial fitness test items by student classification and age along with the physical fitness subtotal and total test score (this combines all 16 test items for ages 8-12). This phase of analysis required that a numerical value be assigned to each performance level (criterion = 4, rudimentary = 3, assisted = 2, and other = 1).

In reviewing Tables 82, 83, and 84, a definite trend was noticed. All locomotor skill subtotals resulted in the normal student classification scoring the highest, followed by educables and then trainables for all ages. This same trend existed for the object control subtotal and total fundamental motor skill

Tables 4-79 may be found in appendix D.

Table 80

Age at Which the Criterion Level of Performance First Appeared for Each Student Classification

Test Item	Classification	Age	Test Item	Classification	Age
Run	N[a]	3	Catch	N	5
	E[b]	7		E	7
	T[c]	7		T	11
Gallop	N	5	Stationary	N	5
	E	7	Bounce	E	5
	T	11		T	8
Hop	N	3	Kick	N	5
	E	6		E	7
	T	8		T	8
Skip	N	4	Two-Hand	N	4
	E	5	Strike	E	5
	T	9		T	7
Horizontal Jump	N	4	Sit-ups[e]	N	8
	E	4		E	8
	T	6		T	5
Slide	N	4	Sit and Reach[e]	N	8
	E	7		E	8
	T	-[d]		T	8
Leap	N	6	Push-ups[e]	N	8
	E	7		E	9
	T	-		T	12
Overhand Throw	N	3	Run/Walk[e]	N	8
	E	7		E	8
	T	8		T	8

[a] Denotes the normal student classification
[b] Denotes the educable mentally impaired student classification
[c] Denotes the trainable mentally impaired student classification
[d] Denotes that the criterion level of performance did not appear in the age range 3-12
[e] This test item was administered to students 6 years old and above

Table 81

Age at Which the Criterion Level of Performance was Mastered by 25%, 50% and 75% or More of the Students in Each of the Student Classification Samples

Test Item	Classification	Age 25%	Age 50%	Age 75%
Run	N[a]	4	4	9
	E[b]	7	9	12
	T[c]	8	-[d]	-
Gallop	N	5	5	7
	E	7	9	12
	T	11	-	-
Hop	N	4	5	7
	E	7	9	10
	T	8	-	-
Skip	N	5	9	9
	E	6	-	-
	T	12	-	-
Horizontal Jump	N	4	5	9
	E	6	9	12
	T	6	-	-
Slide	N	4	9	11
	E	7	10	12
	T	-	-	-
Leap	N	9	10	11
	E	-	-	-
	T	-	-	-
Overhand Throw	N	4	7	-
	E	7	12	12
	T	11	-	-

Test Item	Classification	Age 25%	Age 50%	Age 75%
Catch	N	6	7	9
	E	7	10	12
	T	11	-	-
Stationary Bounce	N	6	7	9
	E	7	9	9
	T	9	-	-
Kick	N	8	10	11
	E	8	12	12
	T	-	-	-
Two-Hand Strike	N	4	9	-
	E	7	10	12
	T	-	-	-
Sit-ups[e]	N	8	9	11
	E	11	12	12
	T	11	12	-
Sit and Reach[e]	N	8	10	12
	E	11	12	-
	T	8	-	-
Push-ups[e]	N	9	12	-
	E	-	-	-
	T	-	-	-
Run/Walk[e]	N	8	8	8
	E	8	8	8
	T	9	9	9

[a] Denotes the normal student classification
[b] Denotes the educable mentally impaired student classification
[c] Denotes the trainable mentally impaired student classification
[d] Denotes that the criterion level was not mastered by this percent of the students at any age between 1-12
[e] This test item was administered to students 8 years old and above

Table 82

The Mean and Standard Deviation for the Locomotor Skill Test Items by Age and Student Classification

Skill	Classification	Age 3		4		5		6		7		8		9		10		11		12	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
	Normal	3.0	.50	3.5	.54	3.5	.51	3.6	.50	3.6	.53	3.4	.51	3.9	.24	3.9	.36	3.9	.25	3.8	.41
Run	Educable	2.7	.52	3.0	.25	2.8	.41	2.7	.76	3.4	.50	3.4	.50	3.7	.46	3.7	.52	3.3	1.11	3.9	.25
	Trainable	1.3	.58	1.9	.09	2.3	.02	2.7	.82	3.0	.58	3.3	.46	3.1	.64	2.8	.41	3.3	.50	3.3	.52
	Normal	2.4	.73	3.8	.46	3.5	.51	3.6	.62	3.9	.33	3.8	.54	3.9	.33	3.6	.50	3.8	.45	3.9	.33
Gallop	Educable	1.8	.75	2.3	.52	2.8	.41	2.9	.38	3.4	.51	3.2	.41	3.5	.51	3.4	.09	3.1	.38	3.6	.09
	Trainable	1.1	.33	1.1	.38	1.3	.52	2.2	.98	2.6	.79	2.9	.35	3.0	.50	2.7	.52	2.9	1.05	3.2	.41
	Normal	2.1	1.05	2.9	.84	3.5	.51	3.3	.79	3.8	.44	3.9	.34	3.9	.33	3.9	.27	3.8	.45	3.8	.41
Hop	Educable	1.5	.55	2.0	.63	2.2	.75	2.6	.98	3.4	.50	3.3	.49	3.6	.50	3.8	.41	3.6	.79	3.8	.45
	Trainable	1.1	.31	1.1	.38	1.3	.52	1.7	.52	2.1	.69	3.0	.93	2.9	.84	3.0	1.10	2.8	1.20	3.0	.63
	Normal	1.7	.87	2.4	.92	3.3	.77	3.3	.60	3.1	.78	3.4	.50	3.8	.39	3.7	.47	3.4	.55	3.7	.52
Skip	Educable	1.1	.33	1.5	.55	2.3	1.03	2.3	1.11	3.2	.73	3.1	.74	3.4	.60	3.3	.52	3.1	1.07	3.0	1.00
	Trainable	1.1	.33	1.1	.35	1.2	.41	1.3	.82	1.3	.76	1.8	.71	2.5	.76	1.8	.75	1.8	1.09	2.5	1.07
	Normal	2.7	.50	3.4	.52	3.5	.51	3.4	.51	3.7	.50	3.5	.52	3.8	.44	3.9	.36	3.4	.55	3.8	.41
H. Jump	Educable	2.2	.41	3.0	.60	3.2	.41	2.9	1.35	3.2	.75	3.3	.70	3.5	.51	3.7	.52	3.3	1.11	3.8	.45
	Trainable	1.1	.35	1.6	.79	2.2	.75	2.2	1.17	2.9	.38	3.4	.52	3.1	.35	3.2	.75	2.9	.93	3.2	.41
	Normal	2.1	.70	3.0	.76	3.2	.66	3.1	.34	3.3	.71	3.4	.50	3.7	.47	3.6	.50	3.9	.33	4.0	0
Slide	Educable	1.1	.33	1.8	.41	2.2	.41	2.7	.49	3.3	.45	3.2	.56	3.5	.51	3.5	.55	3.1	.69	4.0	0
	Trainable	1.1	.58	1.3	.25	1.2	.41	2.0	.89	2.0	.89	2.6	.52	3.0	.40	2.5	.55	2.4	.80	2.8	.41
	Normal	1.3	.58	1.9	.35	2.1	.75	2.8	.75	2.7	.87	3.0	.52	3.5	.51	3.4	.65	3.8	.45	3.7	.52
Jump	Educable	1.0	.00	1.0	.00	1.5	.55	1.6	.79	2.2	.95	2.3	.90	2.8	.70	3.2	.41	3.4	.79	3.2	.45
	Trainable	1.0	.00	1.0	.00	1.0	.00	1.0	.00	1.3	.76	1.9	.84	2.0	.76	1.8	.75	1.9	.60	2.2	.75
	Normal	2.2	.57	2.8	.44	3.2	.43	3.3	.37	3.4	.46	3.5	.21	3.8	.16	3.7	.27	3.7	.27	3.8	.27
Locomotor	Educable	1.7	.31	2.1	.21	2.4	.37	2.5	.66	3.1	.44	3.1	.43	3.4	.33	3.5	.17	3.1	.76	3.7	.34
Sub-Total	Trainable	1.1	.08	1.2	.26	1.5	.31	1.9	.50	2.2	.44	2.7	.39	2.8	.30	2.5	.54	2.4	.81	2.8	.36

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Table 83

The Mean and Standard Deviation for the Object Control Skill Test Items and Total Fundamental Motor Skill Test Score by Age and Student Classification

Skill	Classification	Age																			
		3		4		5		6		7		8		9		10		11		12	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Overhand Throw	Normal	2.7	.71	3.0	.93	2.9	.43	2.9	.25	3.6	.53	3.3	.50	3.7	.47	3.2	.43	3.4	.55	3.5	.55
	Educable	2.3	.82	2.8	.41	2.7	.52	2.7	.49	3.3	.59	3.3	.59	3.3	.50	3.3	.52	3.3	.49	3.9	.25
	Trainable	1.7	.58	2.1	.38	2.3	.52	2.2	.41	2.4	.79	3.0	.54	2.8	.46	2.7	.82	3.2	.67	3.2	.41
Catch	Normal	2.3	.50	2.6	.52	2.9	.56	3.1	.74	3.7	.50	3.6	.63	3.7	.59	3.7	.47	3.9	.34	3.8	.41
	Educable	1.8	.41	2.0	.50	2.5	.55	2.4	.53	3.0	.79	3.3	.46	3.3	.66	3.5	.55	3.4	.53	3.8	.45
	Trainable	1.7	.58	3.0	.33	2.0	.51	2.2	.41	2.1	.69	3.0	.50	2.7	.49	2.7	.52	2.9	.93	2.8	.75
Stationary Bounce	Normal	2.1	.38	2.4	.52	2.9	.60	3.0	.73	3.4	.73	3.4	.63	3.3	.44	3.8	.43	3.8	.45	3.9	.45
	Educable	1.8	.41	2.0	.27	3.0	.71	2.6	.54	3.1	.75	3.3	.49	3.6	.67	3.3	.52	3.4	.54	3.9	.54
	Trainable	1.3	.50	1.9	.30	2.0	.33	2.17	.41	2.4	.54	2.9	.64	3.0	.76	2.8	.93	3.1	.78	3.2	.75
Kick	Normal	2.6	.53	3.0	.40	3.0	.35	3.0	.37	2.8	.44	3.3	.46	3.5	.51	3.6	.50	3.8	.50	3.5	.55
	Educable	2.3	.52	2.7	.52	3.0	.57	3.0	.51	3.2	.39	3.3	.59	3.1	.36	3.2	.41	3.4	.54	3.8	.45
	Trainable	2.3	.50	2.6	.54	2.3	.82	2.7	.52	2.6	.54	3.1	.35	3.0	.54	2.8	.41	3.2	.44	3.2	.41
Two-Hand Strike	Normal	2.4	.53	3.1	.64	3.1	.46	3.3	.45	3.4	.53	3.3	.50	3.5	.52	3.3	.47	3.2	.45	3.5	.55
	Educable	2.0	.30	2.3	.52	3.2	.41	2.9	.69	3.3	.59	3.3	.59	3.3	.40	3.5	.55	3.6	.53	3.8	.45
	Trainable	2.3	.58	2.1	.38	2.3	.52	2.3	.52	2.9	.69	2.8	.46	2.8	.46	3.0	.63	3.0	.53	3.0	.51
Object Control Sub-total	Normal	2.5	.44	2.8	.20	3.0	.36	3.1	.36	3.5	.34	3.4	.46	3.6	.36	3.5	.24	3.6	.24	3.7	.32
	Educable	2.1	.38	2.4	.24	2.9	.24	2.7	.30	3.2	.48	3.3	.50	3.4	.42	3.4	.26	3.3	.36	3.9	.10
	Trainable	1.9	.30	2.1	.16	2.2	.20	2.3	.30	2.5	.40	3.0	.26	2.9	.40	2.8	.50	3.1	.40	3.1	.30
Fundamental Motor Skill Test Score	Normal	2.3	.49	2.8	.26	3.1	.25	3.2	.22	3.4	.27	3.4	.13	3.7	.09	3.6	.10	3.7	.16	3.8	.16
	Educable	1.7	.18	2.2	.13	2.6	.22	2.6	.30	3.1	.26	3.2	.25	3.4	.19	3.4	.10	3.2	.44	3.8	.20
	Trainable	1.4	.05	1.6	.15	1.8	.18	2.0	.29	2.3	.26	2.8	.23	2.8	.16	2.7	.32	2.7	.40	2.9	.21

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Table 84

The Mean and Standard Deviation for the Physical Fitness Skill Test Items and the Total Test Score by Age and Student Classification

Skill	Classification	Age									
		8		9		10		11		12	
		M	SD	M	SD	M	SD	M	SD	M	SD
Sit-ups	Normal	3.4	.50	3.5	.51	3.6	.63	3.8	.45	3.7	.52
	Educable	2.9	.69	2.9	.46	3.2	.45	3.1	.69	3.8	.45
	Trainable	2.4	.52	2.4	.52	2.7	.52	2.4	.53	2.8	.41
Sit & Reach	Normal	3.3	.58	3.5	.51	3.5	.52	2.4	.53	2.8	.41
	Educable	3.1	.52	3.0	.32	3.0	.63	3.1	1.10	3.6	.55
	Trainable	3.1	.64	3.4	.52	3.0	.89	3.3	.50	3.3	.52
Push-ups	Normal	2.9	.68	3.3	.69	2.9	.67	3.2	.45	3.3	.82
	Educable	2.1	.64	2.7	.81	2.7	.52	2.6	.98	3.0	.51
	Trainable	2.1	.83	2.1	.64	1.7	.82	1.7	.71	2.3	1.00
Run/Walk	Normal	3.9	.28	3.9	.38	3.9	.24	3.9	.25	3.9	.22
	Educable	3.7	.75	3.8	.50	3.9	.34	3.6	1.10	3.9	.21
	Trainable	2.9	.99	3.9	.34	3.2	.98	3.1	1.10	2.0	1.10
Physical Fitness (Sub-total)	Normal	3.3	.38	3.6	.25	3.5	.35	3.6	.23	3.7	.40
	Educable	2.9	.45	3.2	.38	3.2	.30	3.0	.83	3.6	.23
	Trainable	2.6	.40	3.0	.25	2.6	.63	2.7	.53	2.6	.58
Total Test Score	Normal	3.4	.24	3.7	.18	3.6	.19	3.7	.19	3.8	.28
	Educable	3.1	.34	3.3	.27	3.4	.19	3.2	.54	3.7	.21
	Trainable	2.8	.31	2.9	.26	2.6	.51	2.7	.58	2.9	.44

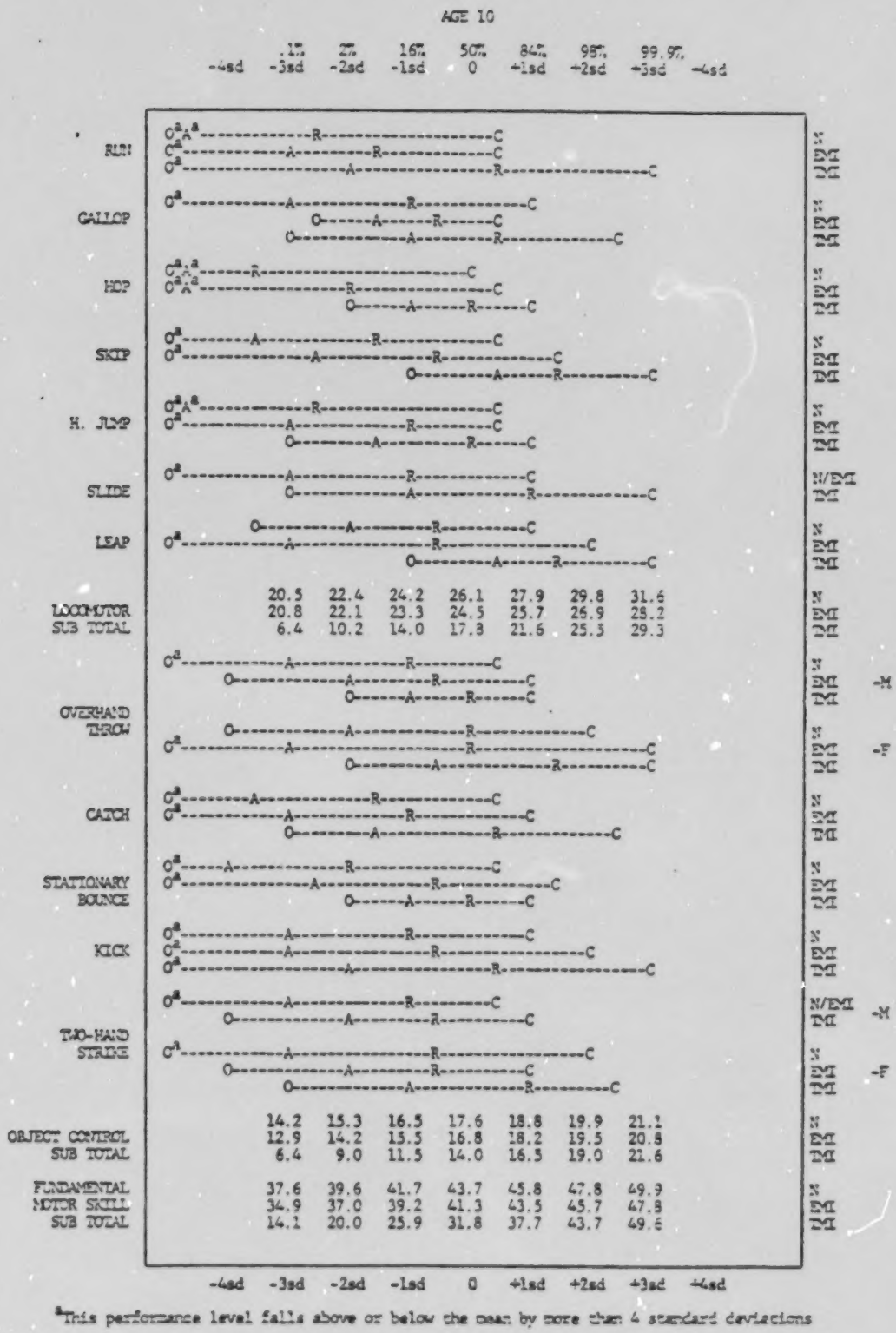
score, with only one slight exception. The 12-year-old educables scored slightly above normal students in the object control skill subtotal. This may have been due in part to several of the normal 12-year-olds' attitudes toward participating in "kids" activities. It would be normal for most 12-year-olds to be more interested in sports skills than in fundamental skills. Physical fitness subtotals along with the total test score resulted in the same trend.

Subsequent to the calculation of means and standard deviations for all test items, subscores and total test score, student profiles were developed by age and student classification. The four possible performance levels for each item (criterion = C, rudimentary = R, assisted = A, and other = O) were plotted on the student profile according to where that performance fell relative to the normative sample. If a 3-year-old normal student performed a rudimentary run, it would be an average performance, but if the same student performed the run at the criterion level, it would result in a performance 2 standard deviations above the mean relative to that child's peer group. It was decided that 4 standard deviations above or below the mean was adequate for describing a student's performance on each test item. It was also decided that 3 standard deviations above or below the mean for subtotal scores and total test scores was an adequate description of student performance. The subtotals and total test score were reported in numerical form on each student profile.

Figures 4 and 5 illustrate student profiles for fundamental motor skills and physical fitness age 10.

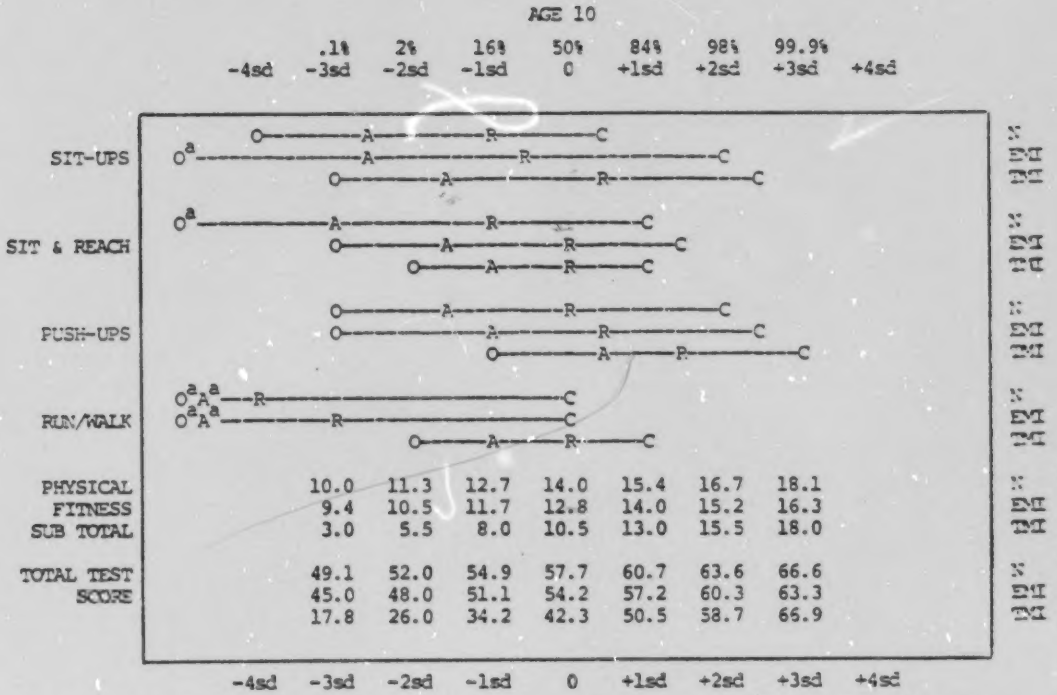
Guidelines for Student Profile Interpretation: The final subsection of this chapter deals with the presentation of several possible guidelines to aid teachers and parents in interpreting the student profiles and making appropriate decisions relative to the functions of this test.

The first function of the test can be achieved by observing which skills the student performs poorly. If a specific student performs below the mean on a test item when compared to the performance of his/her peer group, that skill could be listed as a unique need of that student. By plotting the student's performance across all 16 test items on the student profile, the teacher or parent can quickly see which skills should be listed as weaknesses. If the student performs below the mean on several of the test items within a given skill area (locomotor, object control, or physical fitness), or if the student's subtotal test score is below the mean for that peer group, then the entire skill area can be listed as a general weakness. It will be more precise to pinpoint each skill that is in need of improvement rather than the general skill area. General skill area weaknesses can be used to develop program goal statements for each student.



[a]This performance level falls above or below the mean by more than 4 standard deviations

Figure 4. Student profiles for fundamental motor skills Age 10.



[a]This performance level falls above or below the mean by more than 4 standard deviations

Figure 5. Student profiles for physical fitness age 10.

The second test function can be attained by establishing local criteria for eligibility of special education services in the physical education domain. This function may be best served by observing the subtotal and total test score for each student. For example, if a student's performance falls at 2 standard deviations or more below the mean when compared to normal students, a school system may decide that the student should be eligible for special education in physical education. It is the responsibility of the local school district to set the criteria, whether 1, 2, or 3 standard deviations below the mean. Most qualified physical education teachers that individualize their instruction should be able to meet the needs of students that perform at 1 standard deviation below the mean without specially designed instruction, given that all other learning and social variables are within a normal or average range.

These local criteria should be applied to the locomotor skill, object control skill, and physical fitness skill subtotals along with the total test score for each student. By plotting the student's performance levels on the student profile for each of the 15 test items and converting the performance levels to a numerical scale (4-1 for criterion level through the other level respectively) and adding up the subtotals and total test score, a teacher should be able to make more precise decisions concerning each student's eligibility. If a student meets the local eligibility criteria, specially designed instruction should be developed and placed in his/her IEP.

Placement decisions can be made by comparing a student's performance with the performance of other students in a particular class or setting. If any student, regardless of classification, performs around the mean when compared to a given group, then it appears that the proper placement would be with that group or class.

A school district may want to establish criteria for alternative placements. The following criteria should be viewed as possible examples:

1. Regular class placement - Students that perform around the mean or above on the test items under consideration.

2. Remedial or adapted class placement - Students that exhibit several minor skill weaknesses. This might be for short periods of time until several skill weaknesses are remediated or in addition to the regular class placement. This is appropriate for students that perform at 1 or 2 standard deviations below the mean on a few skills but at the mean or above on most of them. If a student is placed in this setting, specially designed instruction should be developed to remediate skill weaknesses.

3. Special class placement - Students that perform well below the mean on most or all of the skills. This placement is appropriate for students with gross deficiencies in physical education. The placement may be on a full- or part-time basis depending on the student's performance. If a student is placed in this class, specially designed instruction should be mandatory.

If a regular class placement is being considered for educable or trainable mentally impaired students, then it is necessary to compare their performance on each test item with that of the normal students. This can be accomplished by plotting the students' scores on the normal student classification portion of the student profile. A different colored pencil can be used for this purpose rather than a new student profile sheet.

Instructional programming decisions can be made if a local school district's physical education curriculum matches the objectives measured by this test. A precise instructional prescription can be developed based on the identification of skills that the student has not mastered. If a student has mastered the mature run, hop, and horizontal jump, it would be more appropriate to prescribe instruction on the skills that have not been mastered, rather than duplicating instruction on already learned skills. This last function does not require the use of the student profiles. Simply by looking at the raw test scores on each item a teacher can determine the student's present level of performance and select those skills that have not been mastered at the criterion level. This same strategy can be employed for making instructional grouping decisions within a class. By grouping together those students that have the same instructional needs, a teacher can plan more appropriate learning activities.

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The objectives of this study were: 1) select and standardize criterion-referenced test items in the physical education psychomotor domain based on the definition in Public Law 94-142; and 2) develop a set of norms for intellectually normal, educable mentally impaired, and trainable mentally impaired students in the age range of 36 months to 155 months. The emphasis of this study was on the use of criterion- or domain-referenced measures and the establishment of local or special group norms in an effort to promote the use of criterion- or domain-referenced measures to improve instruction in physical education programs.

Public Law 94-142 mandates assessment for three purposes: to determine eligibility for special education services, instructional planning (including the IEP development), and evaluating the effectiveness of the instructional plan. The mandate requires that state and local educational agencies shall ensure that assessment and evaluation procedures be nondiscriminatory. In the opinion of this researcher, assessment must be viewed clearly and simply as the process of collecting data for the purpose of making nondiscriminatory decisions about students using the guidelines provided by PL 94-142.

Review of current assessment instruments available to physical educators as to their conformance with the requirements of PL 94-142 shows tremendous need for revision and development of valid and reliable instrumentation in the physical education domain.

A CRT approach should facilitate nondiscriminatory decision-making because the process becomes one of 1) identifying basic skills that all students are expected to master, 2) assessing all students to determine which of these basic skills are present, and 3) designing appropriate instruction so the remaining skills can be learned.

The CRT instrument developed in this study was designed to assess part of the physical education domain, not the entire area specified by PL 94-142. Locomotor skills, object control skills, and physical fitness skills were identified as representative skill areas for selection of objectives from physical education program goals. The CRT items were constructed to assess the following four levels of performance: criterion (a mature or quality pattern), rudimentary, assisted, and other.

A review of the literature on CRT construction provided eight guidelines that were followed during the CRT standardization process:

1. Determine the function(s) or purpose of the test.

2. Prepare or select objectives to be measured by the test items.

3. Develop the test items.

4. Standardize the directions for administration and scoring of each test item.

5. Evaluate the validity of the test.

6. Evaluate the reliability of the test.

7. Collect normative data.

8. Develop guidelines for test score interpretation.

An effort was made during the standardization process to include test items designed to measure the common factor structures of the motor domain established in studies by Rarick and Dobbins (1972 and 1975) and Rarick and McQuillan (1977).

The criterion level of performance for each test item was established by content experts. The most common qualitative behaviors for each test item were rated on their observability and consistency with research findings on quality performances.

Content validity, descriptive validity and criterion-selection validity were established along with the internal consistency of the test items and the test-retest reliability.

Student performance data were collected on a sample of 279 students in the age range of 3 through 12. The student performance data were analyzed to determine significant differences by age, sex, and student classification. The overhand throw and the two-hand strike resulted in significant differences by sex. All 12 fundamental motor skills resulted in significant differences across age (3-12). Significant student performance differences existed in all 16 test items across the three student classifications (normal, educable, and trainable). On all tests employed to detect significant differences, the Alpha was set at the .01 level. Where significant performance differences were detected, the Tukey Multiple Range Test was conducted to pinpoint the exact location of the difference.

Cumulative percentiles by age and student classification were computed for each student performance level (criterion, rudimentary, assisted, and other). A Table was constructed to provide a summary of ages at which the criterion level of performance first appeared for each student classification on each test item. Another Table was designed to present a summary of

ages at which the criterion level of performance was mastered by 25%, 50%, and 75% or more of the students in each of the student classification samples.

The mean and standard deviation for each test item, subtotal score (locomotor, object control, and physical fitness skills), and total test score were calculated by age and student classification. These data were used to develop student profiles by age and student classification for ease of interpreting the test results. The four possible performance levels for each test item were plotted on the student profile according to where that performance fell relative to the normative sample.

Subsequent to student profile development, guidelines were presented to aid teachers and parents in interpreting the student profiles and making nondiscriminatory decisions relative to the following functions of the CRT:

1. Screening for the identification of students with specific needs in the skill areas measured by the test;

2. To aid teachers, administrators, and parents in making special education eligibility decisions in the physical education content area; and

3. To aid teachers, administrators, and parents in making placement and instructional programming decisions to meet the unique needs of the student in physical education.

The screening function of the test can be achieved by observing which skills the student performs below the mean when compared with a specific norm group. The second function can be achieved by having the local education agency establish eligibility criteria for subtotal and total test scores and comparing the student's performance to the local criteria. An example of local criteria might be 2 standard deviations below the mean. The placement function of the test can be achieved by comparing a student's performance with the performance of other students in a particular class or setting (regular class placement, adapted class, etc.). A local education agency may want to establish performance criteria for the various alternative placements available in their agency.

Instructional programming decisions can be made where the local education agency's physical education curriculum matches the objectives measured by this CRT. Instructional prescription should be developed based on the identification of skills that the student has not mastered. The assessment information needed for this function will be the present level of performance on the objectives of the physical education program.

Conclusions

Within the limitations of this study, the following conclusions were drawn:

1. The CRT standardized in this study has acceptable content validity, descriptive validity, and criterion selection validity.

2. The CRT standardized in this study has excellent internal consistency and test-retest reliability.

3. Males perform significantly better than females on the overhand throw and two-hand strike across all ages and student classifications in the total sample.

4. A significant difference in student performance existed on all 12 fundamental motor skill test items across age for the total sample.

5. A significant difference in student performance existed on all 16 test items across the three student classifications.

Recommendations

The following suggestions are recommended for future research concerned with the development and standardization of criterion-referenced tests in physical education:

1. Add the functional performance level to each skill test item. This would result in five performance levels. The functional level would become the criterion performance while the present criterion level would be called the mature level.

2. Develop and standardize CRT items to measure the other content areas within the PL 94-142 definition of physical education.

3. Collect normative data on other student classification groups such as the hearing impaired and visually impaired. Determine if there is a significant difference between these student classifications.

4. Develop a group test score sheet that is capable of facilitating continuous assessment and evaluation on the same student. This can be achieved by allotting space on the test sheet where several dates and scores can be placed.

5. Evaluate the CRT's sensitivity to appropriately planned instruction.

6. Using a regression strategy, determine which test items account for the most variance within each subtotal and total test score. This might help to determine which test items are the most predictive of the locomotor and object control subtotals, the fundamental motor skill subtotal, and the physical fitness skill subtotal.

7. Determine the observability of the qualitative components placed in the criterion level of performance by collecting assessment data from several content experts. Those components that can be reliably assessed by a majority of the experts should be placed in the criterion level.

8. Establish the degree to which teachers can be trained to use the CRT instrument.

9. Evaluate the CRT's ability to aid parents, teachers, and administrators in making special education eligibility decisions in the physical education content area.

10. Evaluate the CRT's ability to aid in making placement and instructional programming decisions.

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APPENDIX A

LIST OF AMPLIFIED OBJECTIVES SELECTED FOR I CAN AND MICHIGAN'S MINIMAL PERFORMANCE OBJECTIVES

List of Amplified Objectives Selected
for I CAN and Michigan's Minimal
Performance Objectives

1. Given a demonstration, verbal request, 50 feet of clear space, and three trials, the student can perform a quality run three consecutive times in the following manner:

   - A period when both feet are off the floor.
   - Toe-heel or heel-toe-foot contact (not flat-footed).
   - Arms move in opposition to legs, elbows bent.
   - A smooth pattern for 50 feet with the above components.

2. Given a demonstration, verbal request, 30 feet of clear space, and three trials, the student can perform a quality gallop three consecutive strides leading with each foot in the following manner:

   - Brief period when both feet are off the floor.
   - Trailing foot does not cross in front of lead foot at floor contact.
   - Arms swing forward and upward.

3. Given a demonstration, a verbal request, a minimum of ten feet of clear space, and three trials, the student can perform a quality hop three consecutive times forward on each foot in the following manner:

   - Carriage of nonsupport leg is slightly bent.
   - Maintain upright body position, elbows bent.
   - Arms swing forward and upward.

4. Given a demonstration, a verbal request, 30 feet of clear space, and three trials, the student can perform a quality skip for three consecutive skipping cycles in the following manner:

   - Repeat the step and hop on alternate feet in a rhythmical pattern.
   - Arms move in opposition to legs and are slightly bent.

5. Given a demonstration, a verbal request, ten feet of clear space, and three trials, the student can perform a quality horizontal jump three consecutive times in the following manner:

   - Two-foot takeoff and a two-foot landing.
   - Arm thrust during takeoff with full extension of legs.
   - Jump 2/3 of standing height or more.

6. Given a demonstration, a verbal request, 30 feet of clear space, and three trials, the student can perform a quality slide three consecutive times to each side in the following manner:

   - Period where both feet are off the ground and remain parallel.
   - Weight transfer from trail foot to lead foot along a straight line to the side.

7. Given a demonstration, a verbal request, 50 feet of clear space, and three trials, the student can perform a quality leap three consecutive times in the following manner:

   - Takeoff on one foot and a balanced landing on the other foot.
   - Forward reach with arm opposite lead foot.

8. Given a demonstration, a verbal request, an 8-10-inch playground ball, and three trials, the student can perform a quality stationary ball bounce for three consecutive bounces in the following manner:

   - Contact the ball between thighs and waist
   - Push ball with fingers of one hand only
   - Maintain a stable, stationary position.

9. Given a demonstration, a verbal request, a 6-inch playground ball tossed underhand to chest height from a distance of 15 feet, and three trials, the student can perform a quality catch three consecutive times in the following manner:

   - Hands in front of the body, elbows bent
   - Extension of arms in preparation for ball contact
   - Contact and control ball with hands only.

10. Given a demonstration, a verbal request, an 8-10-inch playground ball, and three trials, the student can perform a quality kick three consecutive times in the following manner:

    - A preliminary forward leap on the nonkicking leg with foot placement next to the ball
    - A continuous kicking motion
    - Contact ball so it travels forward at least 30 feet.

11. Given a demonstration, a verbal request, a 3-4-inch ball, and three trials, the student can perform a quality overhand throw three consecutive times in the following manner:

    - Downward arc of throwing arm to initiate overhand throw
    - Hip/trunk rotation
    - Weight transfer to foot opposite the throwing arm
    - Follow through well beyond ball release
    - Ball travels forward 30 feet or more.

12. Given a demonstration, a verbal request, a plastic bat, a light-weight, 6-inch ball suspended at waist height, and three trials, the student can perform a quality two-hand, side-arm strike three consecutive times in the following manner:

    - Side orientation toward desired direction of travel
    - Hip and spine rotation during swing
    - Transfer weight onto front foot during swing.

13. Given a demonstration, a verbal request, and three trials, the student can perform a quality bent-leg sit-up three consecutive times in the following manner:

    - Lie on back, knees bent, feet flat on floor, and arms crossed over chest
    - Curl up to touch elbows to thighs
    - Return to lying position.

14. Given a demonstration, a verbal request, a flat surface, and three trials, the student can perform a quality push-up three consecutive times in the following manner:

    - Assume prone position (belly down) parallel to floor, toes on floor, hands directly under shoulders
    - Keep body parallel to floor while lowering body until it is 1-3 inches above floor
    - Raise body to starting position.

15. Given a demonstration, a verbal request, a flat vertical surface, and three trials, the student can perform a quality sit and reach three consecutive times in the following manner:

    - Assume a sitting position with legs together and knees straight
    - Bend and reach forward to feet with one hand on top of the other
    - Keep legs straight
    - Hold for three seconds.

16. Given a demonstration, a verbal request, and a minimum of 30-by-50 feet of clear space, the student will perform a continuous run/walk for five consecutive minutes.

APPENDIX B

CONTENT EXPERT RATINGS OF THE MOST COMMON QUALITATIVE COMPONENTS OF EACH SKILL SELECTED FOR THE CRT EXPRESSED IN CUMULATIVE FREQUENCY

SKILL	QUALITATIVE COMPONENTS	OBSERV-ABILITY		CONSISTENT W/RESEARCH	
		X[a]	O[b]	X[a]	O[b]
RUN	.A period when both feet are off the floor	3	0	3	0
	.Arms move in opposition to legs, elbows bent	3	0	3	0
	.90° leg flexion of non support leg	1	2	2	1
	.Toe-heel or heel toe foot contact	3	0	3	0
GALLOP	.Brief periods of non-support	3	0	3	0
	.A coordinated lift of the arms	1	2	3	0
	.Trailing foot does not cross in front of lead foot at floor contact	3	0	3	0
	.A steady rhythmical pattern	3	0	3	0
HOP	.Carriage of nonsupport leg is slightly flexed	3	0	3	0
	.Synchronized arm swing forward and upward and elbows bent slightly	3	0	3	0
	.Upright trunk carriage over the support leg	3	0	3	0
SKIP	.A step-hop pattern on alternate feet	3	0	3	0
	.Arms move in opposition to legs and slightly bent	3	0	3	0
HORIZONTAL JUMP	.Two foot take off and two foot landing	3	0	3	0
	.Forceful trust of both arms and full extention of legs at take off	2	1	3	0
	.Thighs near parallel to floor at touch down and arms move forward during landing	0	3	2	1
	.Arms extend vigorously forward and upward upon take-off	3	0	3	0

[a]X denotes a yes response
[b]O denotes a no response

SKILL	QUALITATIVE COMPONENTS	OBSERVABILITY		CONSISTENT W/RESEARCH	
		X	0	X	0
SLIDE	.Weight transfer from the trailing foot to the lead foot along a straight line to the side	3	0	3	0
	.Period where both feet are off ground and remain parallel	3	0	3	0
LEAP	.Take off on one foot and a balanced landing on the other foot	3	0	3	0
	.Forward reach with arm opposite lead foot	3	0	3	0
	.An in-flight forward trunk lean of 80° or less	0	3	2	1
OVERHAND THROW	.Step forward with foot opposite the throwing arm	3	0	3	0
	.Hip, trunk, and shoulder rotation	2	1	3	0
	.A downward arc of the throwing arm to initate overhand throw	3	0	3	0
	.Shift weight to forward foot	3	0	3	0
	.Side orientation toward direction of throw	3	0	1	2
	.Follow through well beyond ball release	3	0	3	0
CATCH	.Hands in front of body, elbows flexed near sides	3	0	3	0
	.Extension of the arms in preparation for ball contact	2	1	2	1
	.Contact the ball with hands only	3	0	3	0
	.Elbows bend as ball makes contact with hands	1	2	2	1
STATIONARY BOUNCE	.Contact ball at about hip height	3	0	3	0
	.Push ball with fingers of either hand	3	0	3	0
	.Ball contacts floor in front of the foot on the side of the bouncing arm	3	0	0	3

SKILL	QUALITATIVE COMPONENTS	OBSERV-ABILITY		CONSISTENT W/RESEARCH	
		X	0	X	0
KICK	.Arm-foot opposition	3	0	3	0
	.Step forward on the non-kicking leg with foot placement next to the ball	2	0	1	2
	.Hip extension and knee flexion	0	3	2	1
	.Leap just prior to the kick	3	0	3	0
	.A single continuous motion	3	0	3	0
TWO-HAND STRIKE	.Side orientation toward direction of travel	3	0	3	0
	.Hip and spine rotation	3	0	3	0
	.Weight transfer from back foot to front foot during swing	3	0	3	0
SIT-UPS	.Lie on back, knees bent, feet flat on floor, arms crossed over chest	3	0	3	0
	.Curl up to touch elbows to thighs	3	0	3	0
	.Return to lying position	3	0	3	0
SIT AND REACH	.Bend and reach forward to feet with one hand on top of the other	3	0	3	0
	.Keep legs straight	3	0	3	0
	.Hold position	3	0	2	1
PUSH-UPS	.Assume a prone position parallel to floor, toes on floor, hands directly under shoulders	3	0	3	0
	.Keeping body parallel to floor while lowering to 1-3" above floor	3	0	3	0
	.Raise body to starting position	3	0	3	0
RUN/WALK	.Run or walk continuously for five consecutive minutes	3	0	2	1

APPENDIX C

CONTENT EXPERT RATINGS OF CRITERION VALIDITY

OBJECTIVE	COMPONENTS	CONSISTENT W/RESEARCH		OBSERV-ABLE	
		X[a]	O[b]	X	O
1. RUN	a. A period when both feet are off the floor	3		3	
	b. Toe-heel or heel-toe foot contact	3		3	
	c. Arms move in opposition to legs, elbows bent	3		3	
	d. Smooth pattern for 50 feet	3		3	
2. GALLOP	a. Brief period where both feet are off the floor	3		3	
	b. Trailing foot does not cross in front of lead foot at floor contact	3		3	
	c. Arms swing forward and upward	3		3	
	d. 3 consecutive gallop strides	3		3	
3. HOP	a. Carriage of nonsupport leg is slightly bent	3		3	
	b. Maintain upright body position, elbows bent	3		3	
	c. Arms swing forward and upward	3		3	
	d. 3 consecutive hops on each foot	3		3	
4. SKIP	a. A step-hop pattern on alternate feet	3		3	
	b. Arms move in opposition to legs and are slightly bent	3		3	
	c. 3 consecutive skipping cycles (step-hop)	3		3	

[a]Denotes a positive rating
[b]Denotes a negative rating

OBJECTIVE	COMPONENTS	CONSISTENT W/RESEARCH		OBSERVABLE	
		X[a]	O[b]	X	O
5. HORIZONTAL JUMP	a. Two feet take off and a two foot landing	3		3	
	b. Arm thrust during take-off with full extension of legs	3		3	
	c. 3 consecutive jumps of 2/3 of standing height or more	2	1	3	
6. SLIDE	a. Weight transfer from trailing foot to lead foot along a straight line to the side	3		3	
	b. Period where both feet are off the ground and remain parallel	3		3	
	c. 3 consecutive slides to each side	3		3	
7. LEAP	a. Take off on one foot and a balanced landing on the other foot	3		3	
	b. Forward reach with arm opposite lead foot	3		3	
	c. 3 consecutive leaps	3		3	
8. OVERHAND THROW	a. A downward arc of the throwing arm to initiate overhand throw	3		3	
	b. Hip and spine rotation	3		3	
	c. Step forward with foot opposite the throwing arm	3		3	
	d. Follow through well beyond release	3		3	
	e. Ball travels 30 feet or more	2	1	3	
	f. 3 consecutive throws	3		3	
9. CATCH	a. Hands in front of body, elbows flexed near sides	3		3	
	b. Extension of arms in preparation for ball contact	3		3	
	c. Contact ball with hands only	3		3	

OBJECTIVE	COMPONENTS	CONSISTENT W/RESEARCH		OBSERVABLE	
		X[a]	O[b]	X	O
	d. 3 consecutive catches	3		3	
10. STATIONARY BOUNCE	a. Contact ball between thighs and waist	2	1	3	
	b. Push ball with fingers of one hand only	3		3	
	c. Maintain a stable, stationary, position	3		3	
	d. 3 consecutive bounces	3		3	
11. KICK	a. A preliminary forward leap on the nonkicking leg with foot placement next to the ball	3		3	
	b. A continuous kicking motion	3		3	
	c. Contact ball so it travels forward at least 30 feet	3		3	
	d. 3 consecutive kicks	3		3	
12. TWO-HAND STRIKE	a. Side orientation toward desired direction of travel	3		3	
	b. Hip and spine rotation	3		3	
	c. Weight transfer from back foot to front foot during swing	3		3	
	d. 3 consecutive strikes	3		3	
13. SIT-UPS	a. Lie on back, knees bent, feet flat on floor, arms crossed over chest	3		3	
	b. Curl up to touch elbows to thighs	3		3	
	c. Return to lying position	3		3	
	d. 3 consecutive sit-ups	3		3	
14. SIT & REACH	a. Assume a sitting position with legs together, knees flat	3		3	
	b. Bend and reach forward to feet with one hand on top of the other, keeping knees straight	3		3	

OBJECTIVE	COMPONENTS	CONSISTENT W/RESEARCH		OBSERV-ABLE	
		X[a]	O[b]	X	O
	c. Hold position for 3 seconds	3		3	
	d. 3 consecutive reaches	3		3	
15. PUSH-UPS	a. Assume a prone position parallel to floor, toes on floor, hands directly under shoulders	3		3	
	b. Keep body parallel to floor while lowering body to 1-3 inches above floor	2	1	3	
	c. Raise body to starting position	3		3	
	d. 3 consecutive push-ups	3		3	
16. RUN/WALK	a. Run or walk continuously	3		3	
	b. 5 consecutive minutes	2	1	3	

APPENDIX D

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Table 4

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE RUN TEST ITEM

Source	df	MS	F	p
Between Groups	9	3.07	7.33	.001
Within Groups	269	.42		
Total	278			

Table 5

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE GALLOP TEST ITEM

Source	df	MS	F	p
Between Groups	9	7.19	13.11	.001
Within Groups	267	.55		
Total	276			

Table 6

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE HOP TEST ITEM

Source	df	MS	F	p
Between Groups	9	10.30	14.64	.001
Within Groups	269	.70		
Total	278			

Table 7

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE SKIP TEST ITEM

Source	df	MS	F	p
Between Groups	9	9.95	10.71	.001
Within Groups	269	.93		
Total	278			

Table 8

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE HORIZONTAL JUMP TEST ITEM

Source	df	MS	F	p
Between Groups	9	3.68	6.[illegible]8	.001
Within Groups	269	.54		
Total	278			

Table 9

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE SLIDE TEST ITEM

Source	df	MS	F	p
Between Groups	9	9.07	16.09	.004
Within Groups	267	.56		
Total	276			

Table 10

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE LEAP TEST ITEM

Source	df	MS	F	p
Between Groups	9	10.50	14.67	.01
Within Groups	269	.72		
Total	278			

Table 11

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE OVERHAND THROW TEST ITEM

Source	df	MS	F	p
Between Groups	9	2.91	7.55	.01
Within Groups	269	.39		
Total	278			

Table 12

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE CATCH TEST ITEM

Source	df	MS	F	p
Between Groups	9	6.16	13.59	.001
Within Groups	268	.45		
Total	277			

Table 13

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE STATIONARY BOUNCE TEST ITEM

Source	df	MS	F	p
Between Groups	9	8.17	19.13	.001
Within Groups	268	.43		
Total	277			

Table 14

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE KICK TEST ITEM

Source	df	MS	F	p
Between Groups	9	2.16	9.08	.01
Within Groups	267	.24		
Total	276			

Table 15

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE TWO-HAND STRIKE TEST ITEM

Source	df	MS	F	p
Between Groups	9	2.77	8.42	.01
Within Groups	267	.33		
Total	276			

Table 16

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE SIT-UPS TEST ITEM

Source	df	MS	F	p
Between Groups	4	.64	1.37	.23
Within Groups	142	.47		
Total	146			

Table 17

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE SIT AND REACH TEST ITEM

Source	df	MS	F	p
Between Groups	4	.78	2.33	.02
Within Groups	142	.34		
Total	146			

Table 18

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE PUSH-UPS TEST ITEM

Source	df	MS	F	p
Between Groups	4	1.25	1.70	.14
Within Groups	142	.73		
Total	146			

Table 19

SUMMARY OF ANALYSIS OF VARIANCE FOR AGE DIFFERENCES ON THE RUN/WALK TEST ITEM

Source	df	MS	F	p
Between Groups	4	1.37	2.46	.04
Within Groups	142	.56		
Total	146			

Table 20

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE RUN TEST ITEM

Source	df	MS	F	p
Between Groups	2	13.43	32.67	.001
Within Groups	276	.41		
Total	278			

Table 21

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE GALLOP TEST ITEM

Source	df	MS	F	p
Between Groups	2	29.31	52.74	.001
Within Groups	274	.56		
Total	276			

Table 22

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE HOP TEST ITEM

Source	df	MS	F	p
Between Groups	2	32.24	40.90	.001
Within Groups	276	.79		
Total	278			

Table 23

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE SKIP TEST ITEM

Source	df	MS	F	p
Between Groups	2	57.92	71.50	.001
Within Groups	276	.81		
Total	278			

Table 24

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE HORIZONTAL JUMP TEST ITEM

Source	df	MS	F	p
Between Groups	2	15.85	30.12	.001
Within Groups	276	.53		
Total	278			

Table 25

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE SLIDE TEST ITEM

Source	df	MS	F	p
Between Groups	2	28.53	44.63	.001
Within Groups	274	.64		
Total	276			

Table 26

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE LEAP TEST ITEM

Source	df	MS	F	p
Between Groups	2	32.12	39.77	.001
Within Groups	276	.81		
Total	278			

Table 27

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE OVERHAND THROW TEST ITEM

Source	df	MS	F	p
Between Groups	2	8.17	19.88	.001
Within Groups	276	.41		
Total	278			

Table 28

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE CATCH TEST ITEM

Source	df	MS	F	p
Between Groups	2	14.72	27.47	.001
Within Groups	275	.54		
Total	277			

Table 29

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE STATIONARY BOUNCE TEST ITEM

Source	df	MS	F	p
Between Groups	2	10.69	17.64	.001
Within Groups	275	.61		
Total	277			

Table 30

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE KICK TEST ITEM

Source	df	MS	F	p
Between Groups	2	3.14	11.24	.001
Within Groups	274	.28		
Total	276			

Table 31

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE TWO-HAND STRIKE TEST ITEM

Source	df	MS	F	p
Between Groups	2	6.30	17.23	.001
Within Groups	274	.37		
Total	276			

Table 32

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE SIT-UPS TEST ITEM

Source	df	MS	F	p
Between Groups	2	12.86	42.12	.001
Within Groups	146	.31		
Total	148			

Table 33

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE SIT AND REACH TEST ITEM

Source	df	MS	F	p
Between Groups	2	1.96	5.78	.004
Within Groups	146	.34		
Total	148			

Table 34

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE PUSH-UPS TEST ITEM

Source	df	MS	F	p
Between Groups	2	15.57	28.49	.001
Within Groups	146	.55		
Total	148			

Table 35

SUMMARY OF ANALYSIS OF VARIANCE FOR STUDENT CLASSIFICATION DIFFERENCES ON THE RUN/WALK TEST ITEM

Source	df	MS	F	p
Between Groups	2	10.37	23.25	.001
Within Groups	141	.45		
Total	143			

Table 36

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE RUN TEST ITEM

Subset	Homogeneous Ages							
1	3	4	5	6				
2	4	5	6	7				
3	5	6	7	8	11	10	9	12

Table 37

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE GALLOP TEST ITEM

Subset	Homogeneous Ages							
1	3	4						
2	5	6	11	10	7	8	9	12

Table 38

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE HOP TEST ITEM

Subset	Homogeneous Ages					
1	3	4				
2	4	5	6			
3	5	6	7	11	8	12
4	7	11	8	12	9	10

Table 39

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE SKIP TEST ITEM

Subset	Homogeneous Ages							
1	3	4						
2	11	5	6	7	8	12	10	9

Table 40

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE HORIZONTAL JUMP TEST ITEM

Subset	Homogeneous Ages							
1	3	4	6					
2	4	6	11	5	7			
3	6	11	5	7	8	9	12	10

Table 41

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE SLIDE TEST ITEM

Subset	Homogeneous Ages					
1	3	4				
2	4	5				
3	5	6	7	11	8	
4	6	7	11	8	10	
5	7	11	8	10	9	12

Table 42

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE LEAP TEST ITEM

Subset	Homogeneous Ages				
1	3	4	5		
2	4	5	6		
3	5	6	7		
4	6	7	8	11	
5	8	11	9	10	12

Table 43

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE OVERHAND THROW TEST ITEM

Subset	Homogeneous Ages					
1	3	4	5	6		
2	4	5	6	10	7	
3	5	6	10	7	8	11
4	10	7	8	11	9	12

Table 44

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE CATCH TEST ITEM

Subset	Homogeneous Ages					
1	3	4	5			
2	4	5	6			
3	5	6	7			
4	6	7	8	11		
5	7	8	11	9	10	12

Table 45

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE STATIONARY BOUNCE TEST ITEM

Subset	Homogeneous Ages				
1	3	4			
2	5	6	7		
3	7	8	11	10	
4	8	11	10	9	12

Table 46

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE KICK TEST ITEM

Subset	Homogeneous Ages					
1	3	4	5			
2	4	5	6	7		
3	5	6	7	8		
4	6	7	8	9	10	11
5	7	8	9	10	11	12

Table 47

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN AGE FOR THE TWO-HAND STRIKE TEST ITEM

Subset	Homogeneous Ages							
1	3	4						
2	4	5	6					
3	5	6	8	7	11	10	9	12

Table 48

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATION FOR THE RUN TEST ITEM

Subset	Homogeneous Classifications
1	TMI[a]
2	EMI[b]
3	Normal[c]

[a]Denotes the Trainable Mentally Impaired Classification
[b]Denotes the Educable Mentally Impaired Classification
[c]Denotes the Normal Classification

Table 49

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATION FOR THE GALLOP TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 50

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATION FOR THE HOP TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 51

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATION FOR THE SKIP TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 52

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE HORIZONTAL JUMP TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 53

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE SLIDE TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 54

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE LEAP TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 55

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE OVERHEAD THROW TEST ITEM

Subset	Homogeneous Classifications	
1	TMI	
2	EMI	Normal

Table 56

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE CATCH TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 57

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS
FOR THE STATIONARY BOUNCE TEST ITEM

Subset	Homogeneous Classifications	
1	TMI	
2	EMI	Normal

Table 58

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE KICK TEST ITEM

Subset	Homogeneous Classifications	
1	TMI	
2	EMI	Normal

Table 59

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE TWO-HAND STRIKE TEST ITEM

Subset	Homogeneous Classifications	
1	TMI	
2	EMI	Normal

Table 60

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE SIT-UPS TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 61

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE SIT AND REACH TEST ITEM

Subset	Homogeneous Classifications	
1	EMI	TMI
2	TMI	Normal

Table 62

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE PUSH-UPS TEST ITEM

Subset	Homogeneous Classifications
1	TMI
2	EMI
3	Normal

Table 63

SUMMARY OF TUKEY MULTIPLE RANGE TEST
FOR DIFFERENCES IN STUDENT CLASSIFICATIONS FOR THE RUN/WALK TEST ITEM

Subset	Homogeneous Classifications	
1	TMI	
2	EMI	Normal

Table 64

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Run Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	11	89	100	100
	4	50	100	100	100
	5	47	100	100	100
	6	63	100	100	100
	7	56	100	100	100
	8	44	100	100	100
	9	94	100	100	100
	10	86	100	100	100
	11	100	100	100	100
	12	83	100	100	100
Educable Mentally Impaired	3	0	67	100	100
	4	0	100	100	100
	5	0	83	100	100
	6	0	86	100	100
	7	41	100	100	100
	8	40	100	100	100
	9	71	100	100	100
	10	67	100	100	100
	11	57	86	86	100
	12	100	100	100	100
Trainable Mentally Impaired	3	0	0	33	100
	4	0	29	58	100
	5	0	50	83	100
	6	0	83	83	100
	7	14	86	100	100
	8	25	100	100	100
	9	25	88	100	100
	10	0	83	100	100
	11	33	100	100	100
	12	33	100	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 65

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Gallop Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	56	89	100
	4	0	75	100	100
	5	53	100	100	100
	6	69	94	100	100
	7	89	100	100	100
	8	88	94	100	100
	9	88	100	100	100
	10	64	100	100	100
	11	80	100	100	100
	12	100	100	100	100
Educable	3	0	17	77	100
	4	0	33	100	100
	5	0	83	100	100
	6	0	86	100	100
	7	44	100	100	100
	8	20	100	100	100
	9	52	100	100	100
	10	60	80	100	100
	11	14	100	100	100
	12	80	80	100	100
Trainable	3	0	0	0	100
	4	0	0	14	100
	5	0	0	33	100
	6	0	50	67	100
	7	0	72	86	100
	8	0	88	100	100
	9	0	100	100	100
	10	0	67	100	100
	11	33	66	89	100
	12	17	100	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 66

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Hop Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	11	34	67	100
	4	25	63	100	100
	5	53	100	100	100
	6	44	94	94	100
	7	78	100	100	100
	8	88	100	100	100
	9	88	100	100	100
	10	93	100	100	100
	11	80	100	100	100
	12	83	100	100	100
Educable	3	0	0	50	100
	4	0	17	84	100
	5	0	33	83	100
	6	14	57	86	100
	7	37	100	100	100
	8	33	100	100	100
	9	62	100	100	100
	10	83	100	100	100
	11	72	86	100	100
	12	80	100	100	100
Trainable	3	0	0	0	100
	4	0	0	14	100
	5	0	0	33	100
	6	0	0	67	100
	7	0	29	86	100
	8	38	63	100	100
	9	25	63	100	100
	10	33	83	83	100
	11	33	66	77	100
	12	17	83	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 67

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Skip Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	22	44	100
	4	13	38	88	100
	5	41	94	94	100
	6	38	94	100	100
	7	33	77	100	100
	8	38	100	100	100
	9	82	100	100	100
	10	71	100	100	100
	11	40	100	100	100
	12	67	100	100	100
Educable	3	0	0	0	100
	4	0	0	50	100
	5	17	33	83	100
	6	42	71	100	100
	7	29	94	94	100
	8	33	80	100	100
	9	48	96	100	100
	10	33	100	100	100
	11	43	86	86	100
	12	33	67	100	100
Trainable	3	0	0	0	100
	4	0	0	13	100
	5	0	0	17	100
	6	0	17	17	100
	7	0	14	14	100
	8	0	13	63	100
	9	13	38	100	100
	10	0	17	67	100
	11	11	22	44	100
	12	25	38	88	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 68

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Horizontal Jump Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	67	100	100
	4	38	100	100	100
	5	53	100	100	100
	6	44	100	100	100
	7	67	100	100	100
	8	50	100	100	100
	9	77	100	100	100
	10	86	100	100	100
	11	40	100	100	100
	12	83	100	100	100
Educable	3	0	17	100	100
	4	17	83	100	100
	5	17	100	100	100
	6	42	71	71	100
	7	35	94	94	100
	8	40	87	100	100
	9	52	100	100	100
	10	67	100	100	100
	11	57	86	86	100
	12	80	100	100	100
Trainable	3	0	0	0	100
	4	0	14	43	100
	5	0	33	83	100
	6	17	34	67	100
	7	0	86	100	100
	8	38	100	100	100
	9	13	100	100	100
	10	33	83	100	100
	11	22	78	89	100
	12	17	100	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 69

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Slide Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	33	78	100
	4	25	75	100	100
	5	35	88	100	100
	6	13	100	100	100
	7	44	88	100	100
	8	38	100	100	100
	9	71	100	100	100
	10	64	100	100	100
	11	100	100	100	100
	12	100	100	100	100
Educable	3	0	0	0	100
	4	0	0	83	100
	5	0	17	100	100
	6	0	71	100	100
	7	25	100	100	100
	8	27	94	100	100
	9	48	100	100	100
	10	50	100	100	100
	11	29	86	100	100
	12	100	100	100	100
Trainable	3	0	0	33	100
	4	0	0	0	100
	5	0	0	17	100
	6	0	33	67	100
	7	0	33	67	100
	8	0	63	100	100
	9	0	100	100	100
	10	0	50	100	100
	11	0	67	78	100
	12	0	83	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 70

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Leap Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	0	33	100
	4	0	0	88	100
	5	0	29	76	100
	6	13	69	94	100
	7	11	67	89	100
	8	13	88	100	100
	9	47	100	100	100
	10	50	93	100	100
	11	80	100	100	100
	12	67	100	100	100
Educable	3	0	0	0	100
	4	0	0	0	100
	5	0	0	50	100
	6	0	14	43	100
	7	6	42	71	100
	8	13	33	87	100
	9	14	62	100	100
	10	17	100	100	100
	11	0	57	86	100
	12	20	100	100	100
Trainable	3	0	0	0	100
	4	0	0	0	100
	5	0	0	0	100
	6	0	0	0	100
	7	0	14	14	100
	8	0	25	63	100
	9	0	25	75	100
	10	0	17	67	100
	11	0	11	78	100
	12	0	33	83	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentaty level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 71

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Overhand Throw Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	12	56	100	100
	4	25	88	88	100
	5	6	88	100	100
	6	19	94	100	100
	7	56	100	100	100
	8	31	94	100	100
	9	71	100	100	100
	10	21	100	100	100
	11	40	100	100	100
	12	50	100	100	100
Educable	3	0	50	83	100
	4	0	83	100	100
	5	0	67	100	100
	6	0	71	100	100
	7	35	94	100	100
	8	33	93	100	100
	9	38	95	100	100
	10	33	100	100	100
	11	29	100	100	100
	12	100	100	100	100
Trainable	3	0	0	67	100
	4	0	14	100	100
	5	0	33	100	100
	6	0	17	100	100
	7	0	57	86	100
	8	13	88	100	100
	9	0	75	100	100
	10	17	50	100	100
	11	33	89	100	100
	12	17	100	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 72

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Catch Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	33	100	100
	4	0	63	100	100
	5	12	82	100	100
	6	33	80	100	100
	7	67	100	100	100
	8	63	94	100	100
	9	76	94	100	100
	10	71	100	100	100
	11	100	100	100	100
	12	83	100	100	100
Educable	3	0	0	83	100
	4	0	0	100	100
	5	0	50	100	100
	6	0	43	100	100
	7	30	71	100	100
	8	27	100	100	100
	9	43	91	100	100
	10	50	100	100	100
	11	43	100	100	100
	12	80	100	100	100
Trainable	3	0	0	67	100
	4	0	0	100	100
	5	0	0	100	100
	6	0	17	100	100
	7	0	29	86	100
	8	0	100	100	100
	9	0	71	100	100
	10	0	67	100	100
	11	33	55	100	100
	12	17	67	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 73

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Stationary Bounce Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	14	100	100
	4	0	37	100	100
	5	12	77	100	100
	6	25	75	100	100
	7	56	89	100	100
	8	50	94	100	100
	9	76	100	100	100
	10	79	100	100	100
	11	80	100	100	100
	12	100	100	100	100
Educable	3	0	0	83	100
	4	0	0	100	100
	5	20	80	100	100
	6	0	57	100	100
	7	29	76	100	100
	8	33	100	100	100
	9	90	100	100	100
	10	33	100	100	100
	11	43	100	100	100
	12	100	100	100	100
Trainable	3	0	0	33	100
	4	0	0	86	100
	5	0	0	100	100
	6	0	17	100	100
	7	0	43	100	100
	8	12	75	100	100
	9	25	75	100	100
	10	17	83	83	100
	11	33	78	100	100
	12	33	83	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 74

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Kick Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	56	100	100
	4	0	100	100	100
	5	6	94	100	100
	6	6	94	100	100
	7	22	100	100	100
	8	27	100	100	100
	9	47	100	100	100
	10	64	100	100	100
	11	75	100	100	100
	12	50	100	100	100
Educable	3	0	33	100	100
	4	0	67	100	100
	5	0	100	100	100
	6	0	100	100	100
	7	18	100	100	100
	8	33	93	100	100
	9	14	100	100	100
	10	17	100	100	100
	11	29	100	100	100
	12	80	100	100	100
Trainable	3	0	33	100	100
	4	0	57	100	100
	5	0	50	83	100
	6	0	67	100	100
	7	0	57	100	100
	8	13	100	100	100
	9	13	88	100	100
	10	0	83	100	100
	11	22	100	100	100
	12	17	100	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level or performance

Table 75

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Two-Hand Strike Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	3	0	44	100	100
	4	25	88	100	100
	5	13	93	100	100
	6	25	100	100	100
	7	44	100	100	100
	8	31	94	100	100
	9	53	100	100	100
	10	29	100	100	100
	11	20	100	100	100
	12	50	100	100	100
Educable	3	0	0	100	100
	4	0	33	100	100
	5	17	100	100	100
	6	14	71	100	100
	7	35	94	100	100
	8	33	93	100	100
	9	33	100	100	100
	10	50	100	100	100
	11	57	100	100	100
	12	80	100	100	100
Trainable	3	0	33	100	100
	4	0	14	100	100
	5	0	33	100	100
	6	0	33	100	100
	7	14	71	100	100
	8	0	75	100	100
	9	0	75	100	100
	10	17	83	100	100
	11	13	88	100	100
	12	0	100	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 76

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Sit-Ups Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	8	38	100	100	100
	9	53	100	100	100
	10	72	93	100	100
	11	80	100	100	100
	12	67	100	100	100
Educable	8	15	69	100	100
	9	5	84	100	100
	10	20	100	100	100
	11	29	86	100	100
	12	80	100	100	100
Trainable	8	0	38	100	100
	9	10	60	100	100
	10	18	76	100	100
	11	26	91	100	100
	12	51	98	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 77

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Sit and Reach Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	8	31	94	100	100
	9	47	100	100	100
	10	50	100	100	100
	11	40	100	100	100
	12	83	100	100	100
Educable	8	20	93	100	100
	9	5	95	100	100
	10	17	83	100	100
	11	43	86	86	100
	12	60	100	100	100
Trainable	8	25	88	100	100
	9	38	100	100	100
	10	33	67	100	100
	11	33	100	100	100
	12	33	100	100	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 78

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Push-Ups Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	8	19	75	100	100
	9	41	88	100	100
	10	14	71	100	100
	11	20	100	100	100
	12	50	83	100	100
Educable	8	0	23	85	100
	9	10	74	90	100
	10	0	67	100	100
	11	14	57	86	100
	12	0	100	100	100
Trainable	8	0	38	75	100
	9	0	25	88	100
	10	0	17	50	100
	11	0	11	56	100
	12	17	33	83	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

Table 79

Cumulative Percentiles by Age and Student Classification for Each Student Performance Level on the Run/Walk Test Item

Classification	Age	C[a]	R[b]	A[c]	O[d]
Normal	8	92	100	100	100
	9	100	100	100	100
	10	100	100	100	100
	11	100	100	100	100
	12	100	100	100	100
Educable	8	85	85	100	100
	9	90	95	100	100
	10	100	100	100	100
	11	86	86	86	100
	12	100	100	100	100
Trainable	8	38	50	100	100
	9	100	100	100	100
	10	50	67	100	100
	11	56	56	100	100
	12	17	17	67	100

[a]Denotes the criterion level of performance

[b]Denotes the rudimentary level of performance

[c]Denotes the assisted level of performance

[d]Denotes the other level of performance

APPENDIX E

A REVIEW OF THE QUALITATIVE COMPONENTS MOST COMMONLY USED TO DESCRIBE THE FUNDAMENTAL MOTOR SKILLS SELECTED FOR INCLUSION IN THE CRITERION-REFERENCED TEST

A REVIEW OF THE QUALITATIVE COMPONENTS MOST COMMONLY USED TO DESCRIBE THE FUNDAMENTAL MOTOR SKILLS SELECTED FOR INCLUSION IN THE CRITERION-REFERENCED TEST

Qualitative Components of a Mature Run

Literature Source	Components
Cratty (1979)	- Reciprocal arm action
Espenschade and Eckert (1967)	- Short period where body is propelled off the ground
I CAN (Wessel, 1976)	- Brief periods of nonsupport - 90° leg flexion of the non-support leg - Foot placement approximately two inches either side of a one-inch line - Heel-toe (moderate speed) or toe-heel-toe (fast speed) foot placement - Arms in opposition to legs, elbows bent - Smooth integration of the above components
Minimal Performance Objectives in Physical Education in the State of Michigan (Department of Education, 1979 Draft)	- Knee of nonsupporting leg bent at least 90° - Consistent periods of non-support - Foot placement near or on line - Heel-toe and/or toe-heel-toe foot contact - Arms in direct opposition to legs, with elbows bent - Smooth integration of the above
Seefeltdt, Reuschlein, and Vogel (1972)	- Heel-toe-foot contact at modest speed - Arm opposition to leg action - Knee of nonsupport leg may flex until it is nearly in contact with buttocks

Wickstrom (1977)	- Period of no support from either leg - Flexion of the knee of the swinging leg being brought closer to the buttocks - Arms in synchronized opposition to the leg action - Toe-heel-foot contact

Qualitative Components of a Mature Gallop

Literature Source	Components
Espenschade and Eckert (1967)	- A coordinated lift of the arms to assist with the balancing
Fuller (1973)	- Maintain a steady rhythmical pattern
I CAN (Wessel, 1976)	- A step forward with the lead foot is followed by a step with the rear foot to a position slightly behind the heel of the lead foot - Brief periods of nonsupport as the rear foot approaches the lead foot, during which time the weight is shifted - Slight flexion of the rear knee during nonsupport phase so that rear foot does not drag on the ground - Arms flexed at sides at about waist level, lifting in a coordinated movement in front of the body during weight transfer - Smooth integration of the above
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- A step forward with the lead foot followed by a step with the rear foot to a position slightly behind the heel of the lead foot

	- A period of nonsupport as the rear foot approaches lead foot during which time the weight is shifted to trail foot - A lifting of flexed arms at waist level coordinated with the shift of weight - A smooth integration of the above
Nester (1977)	- Able to use either foot as lead leg - A coordinated lift of the arms
Sapp (1980)	- A smooth, rhythmical pattern - Trail leg may cross in front of or move adjacent to the lead leg during the airborne phase but is placed adjacent to or behind the lead leg at contact
Sinclair (1971)	- Rhythmical and steady action

Qualitative Components of a Mature Hop

Literature Source	Components
Espenschade and Eckert (1967)	- Take off on one foot and land on same foot
Haubenstricker and Seefeldt (1975)	- Knee of nonsupport leg is flexed at 90° or less - Pendular leg swing to aid in force production - Arms carried close to the sides of the body with elbow flexion at 90°
I CAN (Wessel, 1976)	- Carriage of nonsupport leg near the mid-line of body and slightly flexed at the knee so that nonsupport foot is not more than six inches from the floor

	- Lift of both arms in front of body coordinated with the push-off phase of the hopping action; elbows bent approximately 90° - Smooth integration of the above
Loovis (1975)	- Arms swing forward and upward synchronously
Minimal Performace Objectives in Physical Education in the State of Michigan (1979)	- Upright trunk carriage over the support foot - Carriage of nonsupport leg near the midline and slightly flexed at the knee - Lift up both arms in front of body coordinated with the take-off phase of the hop, elbows bent about 90° - Smooth integration of the above
Nester (1977)	- Upright trunk carriage over support leg - Carrying nonsupport leg near the midline of body - Arms lift in coordination with the push-off phase of hop - Foot of nonsupport leg is carried in back of body

Qualitative Components of a Mature Leap

Literature Source	Components
Broer (1973)	- Take off on one foot and land on opposite foot with smooth transfer of weight - Forward reach
Espenschade and Eckert (1967)	- Take off on one foot and land on the alternate foot
Godfrey and Kephart (1969)	- Take off on one foot and land on opposite foot

I CAN (Wessel, 1976)	- Take off on one foot, land on the other, with a gliding motion in the air and a longer period of nonsupport than in running - An in-flight forward trunk lean of 80° or less - Forward reach with arm opposite the lead foot - Land on the lead foot without losing balance - Smooth integration of the above components
Latchaw (1954)	- Take off on one foot and land on opposite foot - Forward reach in a forceful manner
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Take off on one foot, land on the other - An in-flight forward trunk lean of 80° or less from side view - Forward reach with arm opposite the lead foot - Land on the lead foot without losing balance - Smooth integration of the above
Milne (1972)	- Take off on one foot and land on opposite foot
Nester (1977)	- Push off with one foot and land on opposite foot - Forward and upward reach of arm opposite lead leg - More than 75° forward body lean
Schurr (1967)	- Take off on one foot and land on opposite foot - Forward reach

Qualitative Components of a Mature Horizontal Jump

Literature Source	Components
Cratty (1979)	- Two-foot takeoff and two-foot landing
Espenschade and Eckert (1967)	- Two-foot takeoff and two-foot landing
I CAN (Wessel, 1976)	- Preparatory movement includes 90° ($\pm$ 20°) flexion of both knees with arms extended behind the body - Forceful thrust of both arms and full extension of the legs at takeoff - Take off and land on both feet - Takeoff angle at 45° ($\pm$ 5°) - Feet make contact with floor ahead of body mass - Thighs near parallel to the floor at touch-down; simultaneous forward arm action during landing - Smooth integration of the above
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Preparatory movement includes 90° ($\pm$ 20°) flexion of both knees with arms extended behind the body - A forceful forward-upward thrust of both arms and full extension of the legs at takeoff. - Takeoff angle at 45° ($\pm$ 5°) - Simultaneous foot contact at landing well ahead of body's center of mass - Thighs near parallel to the floor at touch-down - Arms extended forward during landing - Smooth integration of the above

Nester (1977)	- A 90° forward and upward thrust of both arms - Take off with both legs simultaneously - Approximate full extension of both legs in forward and upward direction - Both feet landing simultaneously - Simultaneous vigorous forward thrust of arms as feet make contact
Seefeldt (1976)	- Arms extend vigorously forward and upward upon takeoff, reaching full extension above the head - Full extension of hips and knees - Arms are brought downward and legs are thrust forward until the thigh is parallel to the surface
Wickstrom (1977)	- Crouching and swinging the arms backward and upward - Arms swing forward and upward and body extends - Lower legs flex - Hips flex, arms and trunk move forward and downward - Lower legs extend just prior to landing - Knees bend at impact

Qualitative Components of a Mature Skip

Literature Source	Components
Espenschade and Eckert (1967)	- A step-hop pattern
Godfrey and Kephart (1969)	- Step-hop action - Arm and leg opposition

I CAN (Wessel, 1976)	- Repeat the step and hop on alternate feet - Arms move in opposition to legs at about waist level - A smooth integration of the above components
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Repeat the step and hop on alternate feet - Arms move in a lifting action in opposition to legs - A period of nonsupport with each step-hop - Smooth integration of the above
Nester (1977)	- A rhythmical repetition of the step-hop on alternate feet along a straight line - A smooth low flexion on non-support leg near surface - Arms alternately moving in opposition to leg at about waist level - A smooth-flowing transfer of body weight
Seefeldt and Haubenstricker (1974)	- A step-hop pattern - Rhythmical transfer of weight - Reduced arm action during transfer of weight phase - Foot of supporting leg carried near surface during hopping phase
Sinclair (1973)	- Arm and leg opposition

Qualitative Components of a Mature Slide

Literature Source	Components
I CAN (Wessel, 1976)	- Trunk maintained in an upright position - Weight transfer from the following foot to lead foot along a straight line - Body turned sideways to desired direction of travel

	- Slide to the right and to the left - Smooth integration of the above components
Latchaw (1969)	- A long sideways step of the lead foot - Smooth-flowing weight transfer along a straight line
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Trunk maintained in an upright position - A step sideways followed by a slide of the training leg to a landing position within six inches of the original lead foot position - A period of nonsupport as the trail foot is brought forward - Weight transfer from the following foot to the lead foot - Body turned sideways to the desired direction of travel - Smooth integration of the above
Nester (1977)	- A step sideways with the lead foot - Body faces forward - A slide of following foot next to lead foot - A short nonsupport period - A smooth-flowing weight transfer from following leg to lead foot - Can slide in a straight line
Schurr (1967)	- A long sideways step of the lead foot - Smooth-flowing weight transfer along a straight line
Sinclair (1971)	- A long sideways step of the lead foot - Arms aid in balancing - Sideways straight line motion

Qualitative Components of a Mature Bounce

Literature Source	Components
Espenschade and Eckert (1967)	- One hand contacts ball - Ball contact on upward portion of the bounce
I CAN (Wessel, 1976)	- Contact ball at hip height - Push ball with fingers of either hand - Flex wrist and extend elbow to impart force to ball - Ball contacts floor in front of the foot on the side of the bounding arm - Smooth integration of the above components
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Contact ball at hip height - Contact ball with fingers of either hand - Ball contacts floor in front of (or slightly outside of) the foot on the side of the bouncing arm - Smooth integration of the above

Qualitative Components of a Mature Catch

Literature Source	Components
Cratty (1975)	- Elbows bend as ball makes contact with hands
Espenschade and Eckert (1967)	- Elbows are to the sides of body - Hands are cupped with thumbs or little fingers together
I CAN (Wessel, 1976)	- Hands in front of body, elbows flexed near sides - Extension of the arms in preparation for ball contact - Contact ball with hands only - Elbows bend as arms absorb the force of the ball - Smooth integration of the above components

Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Preparatory positioning with hands in front of body, elbows flexed and near the sides - Extension of arms in preparation for ball contact - Contact ball with hands only - Elbows bend as arms absorb the force of the ball (hands retract at least six inches) - Smooth integration of the above
Seefeldt (1976)	- Preparation phase where elbows are flexed and arms are ahead of frontal plane - Ball is caught and controlled by hands only
Wickstrom (1977)	- Move hands into position for catching - Arms raise in front of body - Hands are cupped with fingers oriented towards the ball - Hands grasp and control ball - Hands give upon contact with ball

Qualitative Components of a Mature Kick

Literature Source	Components
Cratty (1975)	- Running approach to ball - A continuous single motion of approach and kick
Espenschade and Eckert (1967)	- Arm-foot opposition - Full leg backswing with a concomitant forward body lean - Follow-through of kicking leg

I CAN (Wessel, 1976)	- Step forward on the non-kicking leg with foot placement next to ball - Hip extension and knee flexion (at least 120°) during preliminary kicking motion - Contact center of ball with toes or instep - Forward swing of arm opposite kicking leg - Follow-through of kicking foot in an upward motion - Smooth integration of the above components
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- A preliminary forward step on nonkicking leg with foot landing next to the ball - Hip extension and knee flexion (of at least 120°) during preliminary kicking motion - Contact ball with toes or instep - Forward swing of the arm opposite kicking leg - Follow-through to a foot position well beyond and above the point of contact - Smooth integration of the above
Seefeldt and Haubenstricker (1975)	- The distance just prior to the kick is covered by a leap - The knee of the kicking leg is slightly flexed just prior to kicking - The trunk is inclined backward prior to and during contact - The momentum of the kick is dissipated by hopping on the support leg

Wickstrom (1977)	- A preliminary forward step on the support leg - A forward swing of the kicking leg with simultaneous flexion at the hip and knee - Vigorous extension by the lower part of kicking leg - A forward swing of opposite arm in reaction to the action of the kicking leg

Qualitative Components of a Mature Overhand Throw

Literature Source	Components
Cratty (1975)	- Step forward with foot opposite to the throwing arm - Hip-trunk and shoulder rotation - Shift weight to the forward foot
Espenschade and Eckert (1967)	- Trunk rotation - Weight transfer to foot opposite throwing arm
I CAN (Wessel, 1976)	- Almost complete extension of the throwing arm to initiate windup - Side orientation toward direction of throw - Weight transfer to foot opposite throwing arm - Hip and spine rotation in preparation for and during the throwing action - Follow-through well beyond ball release and toward the desired direction of travel - Smooth integration of the above components

Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Side orientation with weight on rear leg to initiate the throw - Near complete extension of the throwing arm to initiate the throw - Weight transfer to the foot opposite the throwing arm - Marked hip and spine rotation during throw - A follow-through well beyond the ball release and in line with target - Smooth integration of the above
Seefeldt and Haubenstricker (1976)	- A downward arc of the throwing arm initiates the windup - Rotation of the hip and spine - The leg opposite throwing arm strides forward - Derotation of the hips, spine and shoulder - Extension of contralateral leg at the knee - Follow-through toward side opposite throwing arm
Wickstrom (1977)	- The body pivots to the side of throwing arm with weight on same foot and throwing arm swings backward and upward - The opposite foot strides forward in the intended direction of throw - Hips, spine and shoulder rotation - The upper arm is rotated medially and then the forearm is extended - Ball release - Follow-through diagonally downward across body toward the stable forward foot

Qualitative Components of a Mature Two-Hand Strike

Literature Source	Components
I CAN (Wessel, 1976)	- Dominant hand gripping bat above nondominant hand - Side orientation toward direction of travel - Bat is held behind dominant shoulder prior to strike - Hip and spine rotation during swing and follow-through - Weight transfer from back foot to front foot during swing - Follow through well beyond point of contact - Smooth integration of the above components
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Dominant hand gripping ball (palm up) above nondominant hand (palm down) - Side orientation (non-dominant side toward direction of travel) - Bat held behind dominant shoulder prior to strike - Hip and spine rotation during swing and follow-through - Weight transfer from back foot to front foot during swing - Follow through well beyond point of contact - Smooth integration of the above
Seefeldt and Haubenstricker (1976)	- Transfer of weight is in a contralateral pattern - Shift of weight to forward foot occurs while bat is still moving backward - Bat is kept near body at the initiation of forward movement - Weight is on forward foot at ball contact

Wickstrom (1977)	- Body weight is shifted in direction of intended hit while shoulders and arms are coiled in the opposite direction - Hips and spine are rotated in rapid succession in the same direction as the weight shift - Arms swing around and forward

APPENDIX F

THE TEST ITEMS COMMONLY USED TO ASSESS THE SELECTED PHYSICAL FITNESS PARAMETERS TO BE USED IN THE CRITERION-REFERENCED TEST

THE TEST ITEMS COMMONLY USED TO ASSESS THE SELECTED PHYSICAL FITNESS PARAMETERS TO BE USED IN THE CRITERION-REFERENCED TEST

Literature pertaining to the physical fitness skills selected for inclusion in this study has been reviewed in an attempt to identify various test items that are appropriate for assessing the following four common physical fitness parameters. The four parameters appear to be representative of the physical fitness domain. Various tests will be identified along with the test item corresponding to each parameter.

Measures of Cardiorespiratory Endurance

Test Source	Test Item
AAHPER Special Fitness Test for Mildly Mentally Retarded Persons (AAHPER, 1976)	300 yd. run-walk for time
AAHPER Youth Fitness Test (Hunsicker & Reiff, 1976)	600 yd. run-walk for time
Fait Physical Fitness Battery for Mentally Retarded Children (Fait, 1972)	300 yd. run-walk
Fitness and Work Capacity Testing (Sharkey, 1977)	1.5-mile run for time
I CAN (Wessel, 1976)	Jog/walk continuously for 5-15 minutes depending on age

Test Source	Test Item
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	- Run-walk continuously until designated distance is covered - Maintain a steady pace throughout the run - At least one mile distance
Motor Fitness Test for the Moderately Mentally Retarded (Johnson and Londeree, 1976)	- 300 yd. run-walk for time - 300 yd. run for time
Measures of Abdominal Strength	
AAHPER Special Fitness Test for Mildly Mentally Retarded Persons (AAHPER, 1976)	Sit-ups
AAHPER Youth Fitness Test (Hunsicker and Reiff, 1976)	Flexed leg sit-ups
Fitness and Work Capacity Testing (Sharkey, 1977)	Bent let sit-ups in 30 seconds
I CAN (Wessel, 1976)	Perform continuous bent leg sit-ups for specified minimal performance criteria (from 5-31 depending on age and sex)
Kraus-Weber Minimum Muscular Fitness Tests (Kraus and Hirschland, 1954)	One bent leg sit-up
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	A Quality Bent Leg Sit-up - Student lies on floor in supine position with knees bent approximately 90°, feet flat on floor and together, hands clasped behind head - Initiates curl-up by tucking chin and lifting trunk - Completes curl-up by touching the elbows to the knees

Test Source	Test Item
	- Lowers upper body in a controlled movement (shoulder blades return to surface) - Five consecutive times
Motor Fitness Test for the Moderately Mentally Retarded (Johnson and Londeree, 1976)	Bent leg sit-ups in 30 seconds
Physical Fitness for the Mentally Retarded (Hayden, 1964)	Sit-ups in 30 seconds
Measures of Trunk and Leg Flexibility	
Frostig Movement Skills Test Battery (Orpet, 1972)	Sitting, bending, reaching
I CAN (Wessel, 1976)	Perform a sit and reach for 3 seconds
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	A Quality Sit and Reach - Sit on floor and place legs such that the heels are 5-7 inches apart and feet in contact with a vertical surface - Knees maintain contact with the floor (legs straight) - Place one hand on top of the other, lean forward, leaning as far past the feet as possible - Maintain the flexed position for at least 3 seconds
Motor Fitness Test for the Moderately Mentally Retarded (Johnson and Londeree, 1976)	Sitting bob and reach

Test Source	Test Item
Physical Fitness for the Mentally Retarded (Hayden, 1964)	Standing floor touch

Measures of Arm and Shoulder Strength

Test Source	Test Item
AAHPER Special Fitness Test for Mildly Mentally Retarded Persons (AAHPER, 1976)	Flexed-arm hang for time
AAHPER Youth Fitness Test (Hunsicker and Reiff, 1976)	Flexed-arm hang (females), pull-ups (males)
Fait Physical Fitness Battery for Mentally Retarded Children (Fait, 1972)	Bent-arm hang for time
Fitness and Work Capacity Testing (Sharkey, 1977)	Push-ups in 60 seconds
I CAN (Wessel, 1976)	To perform a flexed-arm hang
Minimal Performance Objectives in Physical Education in the State of Michigan (1979)	A Quality Push-up - Assume a prone position parallel to floor, hands directly under shoulder, toes on floor (K-3, knees on floor) - Body lowered until elbows flexed to 90° or less - At least 5 seconds - Three consecutive push-ups
Motor Fitness Test for the Moderately Mentally Retarded (Johnson and Londeree, 1976)	Flexed-arm hang for time
Physical Fitness for the Mentally Retarded (Hayden, 1964)	Straight-arm hang for time

APPENDIX G

A STANDARDIZED CRITERION-REFERENCED TEST IN FUNDAMENTAL MOTOR SKILLS AND PHYSICAL FITNESS

TEST MANUAL

FIELD TEST EDITION

Field Service Unit in Physical Education
and Recreation for the Handicapped
Michigan State University

A STANDARDIZED CRITERION-REFERENCED
TEST IN FUNDAMENTAL MOTOR SKILLS AND
PHYSICAL FITNESS

TEST MANUAL

Name _____ Student Classification _____

Sex _____ Test Date _____

Age _____ Test Administrator _____

OBJECTIVE	EQUIPMENT	DIRECTIONS	CRITERIA
RUN C R A O	50 feet of clear space; colored tape; chalk or other marking devices	Mark off a starting line. Mark off a finishing line 50 feet away. Instruct student to "run fast" from one line to the other.	- A period when both feet are off the floor - Toe-heel or heel-toe foot contact (not flat footed) - Arms move in opposition to legs, elbows bent - Smooth (not jerky) pattern for 50 feet
GALLOP C R A O	A minimum of 30 feet of clear space	Ask student to gallop leading with one foot and then the other.	- Brief period where both feet are off the floor - Trailing foot does not cross in front of lead foot at floor contact - Arms swing forward and upward - 3 consecucive gallop strides leading with each foot

SCORING KEY

C - Performs to criterion level as specified in description.
R - Performs skill, but lacks some quantitative or qualitative aspects.
A - Requires some physical assistance.
O - No response or inappropriate.

OBJECTIVE	EQUIPMENT	DIRECTIONS	CRITERIA
HOP C R A O	A minimum of 10 feet of clear space	Ask student to hop 3 times, first on one foot and then on the other.	- Carriage of non-support leg is slightly bent - Maintain upright body position, elbows bent - Arms swing forward - 3 consecutive hops forward on each foot
SKIP C R A O	A minimum of 30 feet of clear space	Ask student to skip. Emphasize the step-hop.	- Repeat the step and hop on alternate feet in a rhythmical (not jerky) pattern - Arms move in opposition to legs and are slightly bent - 3 consecutive skipping cycles (a step-hop)
HORIZONTAL JUMP C R A O	10 feet of clear space; tape or other marking devices	Mark off a starting line on floor, mat or carpet. Have student start behind the line. Tell student to "jump far."	- Two-foot takeoff and a two-foot landing - Arm thrust during takeoff with full extension of legs - 3 consecutive jumps of 2/3 of standing height or more
SLIDE C R A O	A minimum of 30 feet of clear space; colored tape or other marking device	Mark off a straight line. Ask student to do a slide 3 times to each side, staying on the line.	- Period where both feet are off ground and remain parallel - Weight transfer from trail foot to lead foot along a straight line to the side - 3 consecutive slides to each side
LEAP C R A O	A minimum of 50 feet of clear space	Ask student to leap. Tell him/her to take large steps leaping from one foot to the other.	- Takeoff on one foot and a balanced landing on the other foot - Forward reach with arm opposite lead foot - 3 consecutive leaps

OBJECTIVE	EQUIPMENT	DIRECTIONS	CRITERIA
SIT-UPS (Abdominal strength) C R A O	Mat or carpet; stopwatch	Instruct student that on the signal "go," s/he should do 3 sit-ups. Student's ankles should be held by another person. Delete this item for students under 8 years of age.	- Lie on back, knees bent, feet flat on floor, arms crossed over chest - Curl up to touch elbows to thighs - Return to lying position - 3 consecutive sit-ups
OVERHAND THROW C R A O	3-4-inch ball; target 5x5 feet; wall; 40 feet of clear space; tape for marking purposes	Place a target on the wall. Mark off a starting line 30 feet from wall. Ask student to throw ball "hard" at the target.	- Downward arc of throwing arm to initiate overhand throw - Hip/spine rotation - Weight transfer to foot opposite throwing arm - Follow-through well beyond ball release - Ball travels 30 feet or more - 3 consecutive throws
SIT AND REACH (Trunk/Leg flexibility) C R A O	Bench or flat vertical surface (wall)	Place a bench on its side. Sitting with legs straight and feet flat against bench, ask student to touch his/her toes without bending the knees.	- Assume a sitting position with legs together and knees straight - Bend and reach forward to feet with one hand on top of the other keeping legs straight - Hold for 3 seconds - 3 consecutive reaches
CATCH C R A O	6-8-inch playground ball; 20 feet of clear space; tape or other marking device	Mark off 2 lines 15 feet apart. Student stands on one line and the tosser on the other. Toss the ball underhand directly to student with a slight arc and tell him/her to "catch it with your hands." Only count those tosses that are between student's shoulders and waist.	- Hands in front of body, elbows bent near sides - Extension of arms in preparation for ball contact - Contact and control ball with hands only - 3 consecutive catches

OBJECTIVE	EQUIPMENT	DIRECTIONS	CRITERIA
STATIONARY BOUNCE C R A O	8-10-inch playground ball; hard, flat surface (floor, pavement)	Ask student to bounce ball as many times as he/she can, using one hand.	- Contact the ball between thighs and waist - Push ball with fingers of one hand only - Maintain a stable, stationary position - 3 consecutive bounces
PUSH-UPS (Arm/ shoulder strength) C R A O	A flat surface	Ask student to do 3 push-ups. Delete this item for students under 8 years of age.	- Assume prone position parallel to floor, toes on floor, hands directly under shoulders - Keep body parallel to floor while lowering body to 1-3 inches above floor - Raise body to starting position - 3 consecutive push-ups
KICK C R A O	8-10-inch playground ball; 30 feet of clear space; tape or other marking device	Mark off a line 30 feet away from a wall. Place the ball on the line and ask student to kick ball toward the wall.	- A preliminary forward leap on the non-kicking leg with foot placement next to the ball - Continuous kicking motion - Contact ball so it travels forward at least 30 feet - 3 consecutive kicks
TWO-HAND SIDEARM STRIKE C R A O	4-6-inch light-weight ball; batting tee; plastic bat; traffic cone or ball suspended on rope	Place the ball on the batting tee. Give student the bat and ask him/ her to "hit the ball far."	- Side orientation toward desired direction of travel - Hip and spine rotation during swing - Transfer weight onto front foot during swing - 3 consecutive strikes

OBJECTIVE	EQUIPMENT	DIRECTIONS	CRITERIA
WALK/RUN (Cardio-respiratory endurance) C R A O	A minimum of 30x50 feet of clear space; 4 chairs or cones; stopwatch or clock	Mark off a clear oval space by placing chairs or cones at 4 corners of a gym. If available, use a round track. Ask student to run around the outside of the chairs. Tell student to run slowly and as long as he/she can. If student tires, he/she may walk. Delete this item for students under 8 years of age.	- Run/walk continuously - 5 consecutive minutes

Functions of the Test

1. Screening for the identification of students with specific needs in the fundamental motor and physical fitness skill areas.
2. Aid teachers, administrators and parents in making special education eligibility decisions in the physical education content area.
3. Aid teachers, administrators and parents in making placement and instructional programming decisions to meet the unique needs of the student in physical education.

Appropriate Student Population

This test was standardized on students within the age range of 3-12 years. The stratified sample consisted of 145 male (52%) and 134 female (48%) students in the regular education setting (normal, learning disabled and emotionally impaired), educable mentally impaired and trainable mentally impaired students. The sample was representative of whites (82%), blacks (15%), and other minority groups (3%). The standardization sample was reflective of the white collar and blue collar labor force. Students in urban, suburban, and rural schools in Michigan were sampled.

Directions for Administration and Scoring

General Directions

1. Before testing, read the entire test to acquaint yourself with each item, its equivalent requirements, directions, and criteria.
2. Assemble all materials prior to testing. Mark off the appropriate distances.

Materials	Distances to Mark Off
Colored tape/chalk/ marking devices	50 feet for running
Mat or carpet	30 feet for overhand throw and kick
Stopwatch	15 feet for catch
3-4-inch ball	30x50 feet of clear space for run/walk
Target 5x5 feet	
Bench or flat vertical surface	
6-8-inch playground ball	
9-10-inch playground ball	
4-6-inch light-weight ball	
Plastic bat	
Batting tee/traffic cone/ suspended ball	
4 chairs or cones	

3. The test administrator may want to set up stations to facilitate moving students from one item to the next. Start at any point in the test battery; however,

continue according to the specified order. The test was designed to alternate strenuous with less strenuous items.

4. The average administration time to assess one student on all 16 items is 25 minutes. This will obviously vary according to the age and performance level of the student.

Specific Directions

1. Precede the assessment by an accurate demonstration and verbal request.
2. Allow two practice trials where no feedback or instruction is provided to assure that the student understands what to do.
3. Provide one additional demonstration where the student does not know what to do on the first trial.
4. Provide instructions in the student's native language or mode of communication (e.g., sign language, bliss symbols).

Scoring

The scoring grid would appear as such:

OBJECTIVE	EQUIPMENT	DIRECTIONS	CRITERIA
STATIONARY BOUNCE C R A O	One 8-10-inch playground ball	Instruct student to release ball, and then bounce (dribble) it in place.	-Contact ball between thigh and waist -Push ball with fingers of one hand only -Maintain a stable, stationary position -Bounce ball 3 consecutive trials

There are four letters that can be circled to describe the student's response. Circle the letter that best describes the individual's responses.

C - Student completes the item according to all stated criteria. Any quantitative criteria stating "consecutive trials" requires performance of all qualitative criteria the stated number of times.

R - Student responds according to some of the criteria but not all of the stated criteria (lacks quantitative or qualitative aspects).

A - Student needs some form of physical assistance to respond, such as manipulating the student, guiding a student's hand or tapping of student's limb. Through physical assistance, the student can perform a minimum of one qualitative criterion.

O - The student does not respond, responds inappropriately, resists assistance, or cannot perform a minimum of one qualitative criterion with physical assistance.

Sample Item: Stationary Bounce

The materials needed are an 8-10-inch playground ball and a hard surface (floor, pavement) for the student to bounce the ball on. Ask the student to bounce (dribble) the ball. Demonstrate the skill according to the stated criteria. Observe student to make sure he/she performs the skill the specified number of repetitions or the specified distance. Then, circle the letter on the score sheet that best describes the student's performance.

C - Criterion Level: The student performs the skill in accordance with all the stated criteria:
- contact ball between thigh and waist
- push ball with fingers of one hand only
- maintain stable, stationary position
- bounce ball 3 consecutive times

R - Rudimentary Level: The student performs the skill without assistance but not in accordance with all the stated criteria. There must be at least one observable qualitative or quantitative aspect. Examples for "bounce":

- slaps ball with hand; or
- uses two hands to bounce; or
- travels while bouncing; or
- doesn't bounce 3 consecutive times

A - Assistance Level: The student performs the skill at the rudimentary level with some physical prompting. Example for "bounce":

- the teacher holds student's hand(s) and guides him/her through the bouncing action.

O - Other Response Level: The student does not achieve a minimum of one criterion even with physical assistance, refused to respond, or responds inappropriately. Examples for "bounce":

- after student is given a demonstration, he/she throws the ball away
- student releases ball and chases after it as it bounces, attempting to hit it, but without success. Student resists assistance of instructor.

Suggestions to Aid in the Administration and Scoring of the Test Based on Field Test Experiences

RUN

1. Listen to the feet as student runs. If they are slapping loudly on the floor, this is a sign that toe-heel, heel-toe contact is not being made.
2. When assisting the student, hold his/her hand and run slightly in front of him/her, pulling on the arm. To score "A", be sure there is a period when both feet are off the floor; otherwise it is just a walk.

GALLOP

1. Tell student to put his/her favorite foot in front and gallop. Then, tell him/her to put the other foot in front. Be sure to observe student with each foot as the lead foot.
2. If student needs assistance, hold his/her hand and verbally cue as you gallop together.

HOP

1. The hop should be controlled. The student should be balanced on his/her landing.
2. If student needs assistance, allow him/her to hold onto something for support (person, wall, chair, etc.).

SKIP

1. Student must demonstrate s/he can perform the step-hop pattern on each foot in order to receive a "C" or an "R".
2. Skip should look smooth and rhythmical and not choppy.
3. If student needs assistance, hold his/her hand and verbally cue as you slowly "step-hop" together.

HORIZONTAL JUMP

1. When assisting student, stand facing him/her, hold both hands and pull forward as you verbally cue him/her to jump.

SLIDE

1. Have student do the slide along a line near a wall. Cue the student to watch the wall. Be sure feet are parallel to each other.
2. Watch to see that there is a moment when both feet are off the ground.
3. If student needs assistance, stand behind him/her and touch each leg as you verbally cue student to pick it up and slide it along a line.

LEAP

1. Verbally cue student to jump from one foot to the other. Tell him/her to pretend there are big puddles on the ground and to take "big jumping steps" to get over the puddles.

2. Students will often "run" instead of leap. Watch to make sure the legs are straight (not bent at the knee) for each stride.
3. If student needs assistance, stand beside him/her holding his/her hand. Touch one leg and verbally cue to jump forward onto it. Repeat with the other leg.

SIT-UPS

If the student needs assistance, place your arm across the lower back and exert pressure upward to initiate sitting up.

OVERHAND THROW

1. When beginning the throw, the ball should be extended slightly in front of the student, then dropped downward in an arc (a wind-up), then drawn up and back over the shoulder.
2. In watching for the hip and spine rotation, student's hips should turn first, followed by rotation of the upper body as ball is released.

SIT AND REACH

1. If you do not have a bench to use, you can have student sit with feet against a wall.
2. When assisting student, hold his/her knees down and help him/her reach forward to touch toes.

CATCH

1. If student traps ball against the body with his/her arms, score "R".
2. If student needs assistance, stand behind him/her. Have someone toss the ball. Take student's hands and assist him/her to catch ball with hands or trap the ball against the body.

BOUNCE

1. If student bounces ball with two hands, ask him/her to use only one hand. If student still uses two hands, score "R".
2. Student should not be moving his/her feet while bouncing.
3. If student needs assistance, stand behind him, drop ball for him/her, take student's hand and bounce ball together.

PUSH-UPS

1. Be sure hands are pointed forward, student on toes.
2. The lowering action should be caused by the elbows bending. The raising action will be caused by the elbows extending.
3. If student needs assistance, hold him/her at the waist with both hands. Verbally cue to "bend the elbows" as you assist to lower and "extend the elbows" as you assist to raise.

KICK

1. The forward leap onto the non-kicking foot is sometimes difficult to observe. A good indication that this has occurred is if a) the ball is airborne (vs. rolling on ground, and b) student hops forward onto the non-kicking foot following the kick.
2. When demonstrating, emphasize and verbally cue the leap forward onto the non-kicking foot.
3. If student needs assistance, hold one hand and use your other hand to guide the kicking leg to contact the ball.
4. The teacher or aide should position themselves close to the ball in case student steps on ball and falls backwards.

STRIKE

1. Weight transfer is observable by student picking up forward foot and stepping onto it as s/he swings.
2. If student needs assistance, stand behind him/her, holding your hands on top of the student's. Swing together to hit the ball.

WALK-RUN

1. Score "C" if student walks/runs for five consecutive minutes.
2. Score "R" if student stops once but resumes walking/ running after verbal prompt.

3. Score "A" if student stops one or more times but resumes running/walking after verbal and physical prompting.
4. Score "O" if student stops and sits down, does not respond to verbal and physical prompting, or refuses to continue.

Directions for Using Student Profiles

1. Locate the appropriate student profile (in the next section of this manual) according to the age of the student (3-12 years).
2. Transfer student's test results onto the student profile.
   2.1 Determine which student classification is appropriate (normal, educable mentally impaired, or trainable mentally impaired). Determine the student's gender for the overhand throw and two-hand strike (M-F).
   2.2 Using the student's test score sheet, transfer the item scores onto the student profile by circling the appropriate letter for each item.
   2.3 Convert each of the item scores into a numerical form using the following scale: C = 4, R = 3, A = 2, O = 1.
   2.4 Calculate the locomotor subtotal by adding up the first seven test items. Circle the subtotal score on the profile closest to that of the student.

2.5 Calculate the object control subtotal by adding up test items 8-12. Circle the score on the student profile closest to that of the student.

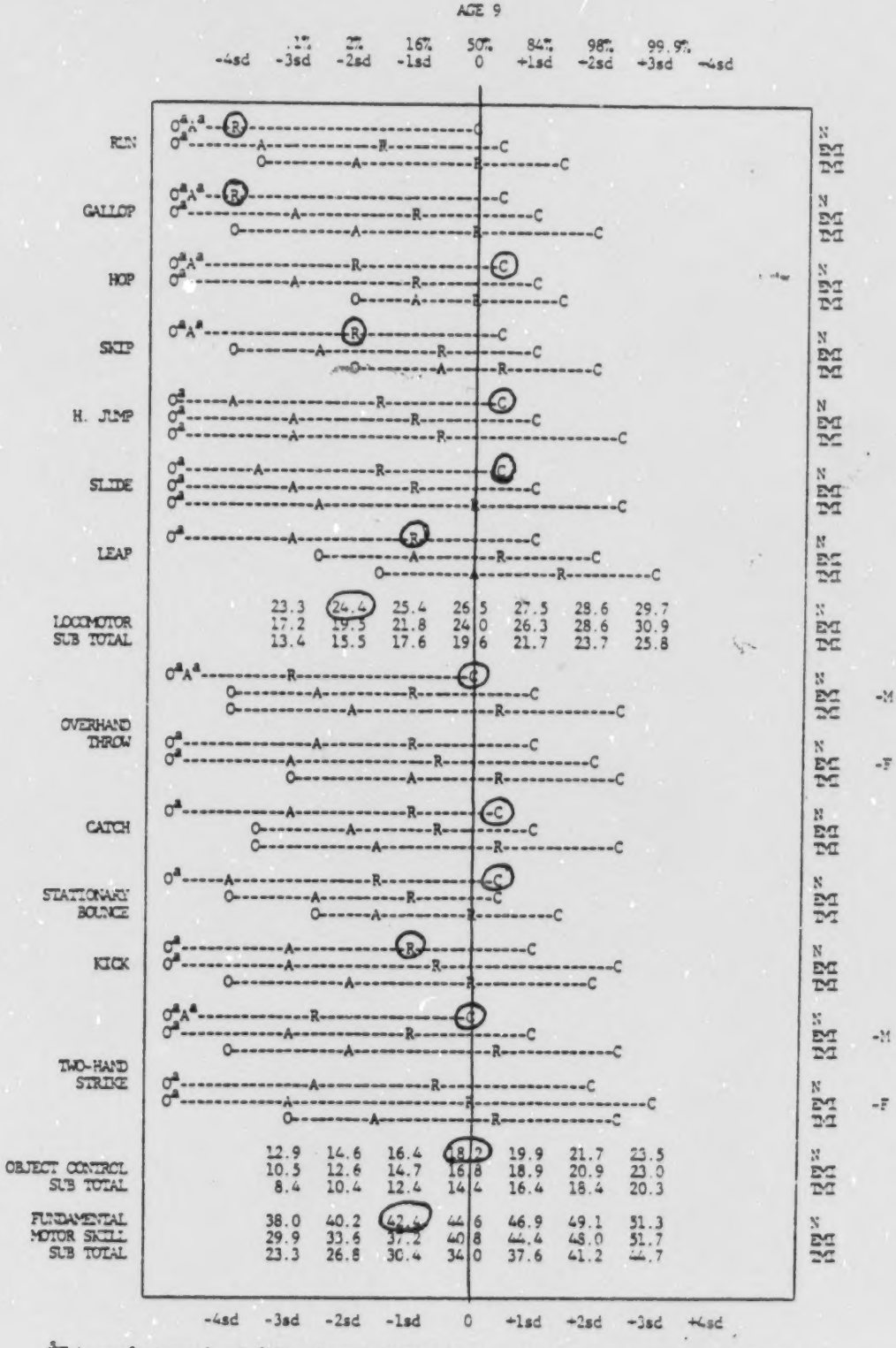
2.6 Calculate the fundamental motor skill subtotal by adding the student's locomotor subtotal and object control subtotal. Circle the score on the profile closest to that of the student.

2.7 For students 8-12 years of age, calculate the physical fitness subtotal by adding up test items 13-16. Circle the score on the profile closest to that of the student.

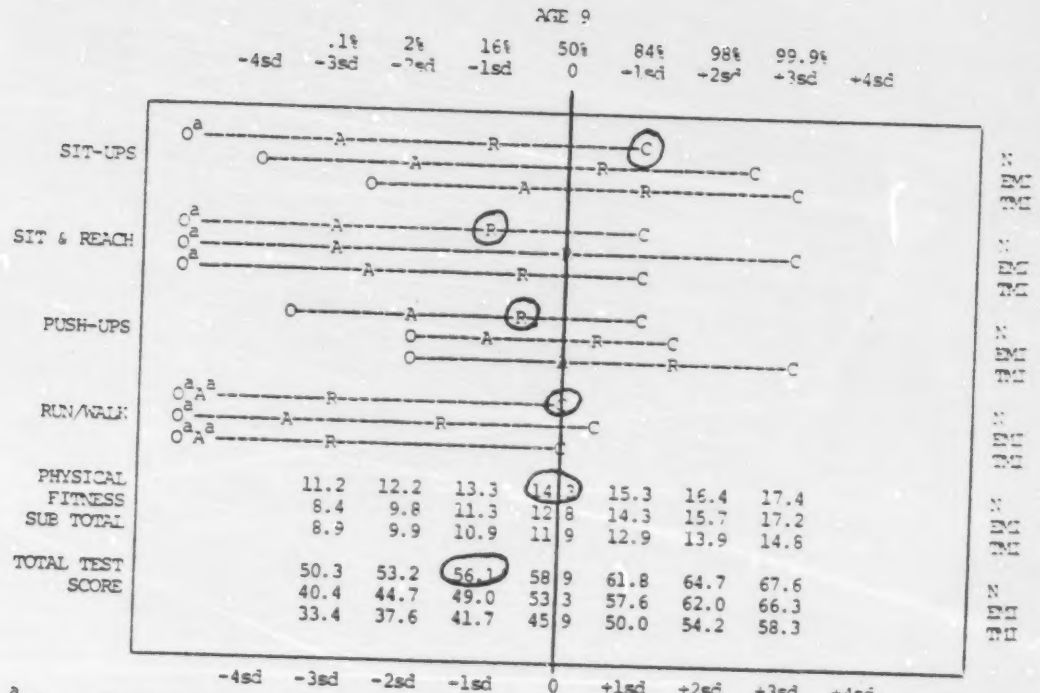
2.8 For students 8-12 years of age, calculate the total test score by adding up the three subtotal scores. Circle the score on the profile closest to that of the student.

3. For ease of viewing the student profile and making decisions about the student's performance, it is recommended that a light line be drawn between the zero at the top of the profile and the zero at the bottom. This line will represent the average performance in which to make normative interpretations.

The completed profile should look something like the following example of a 9-year-old normal male student.

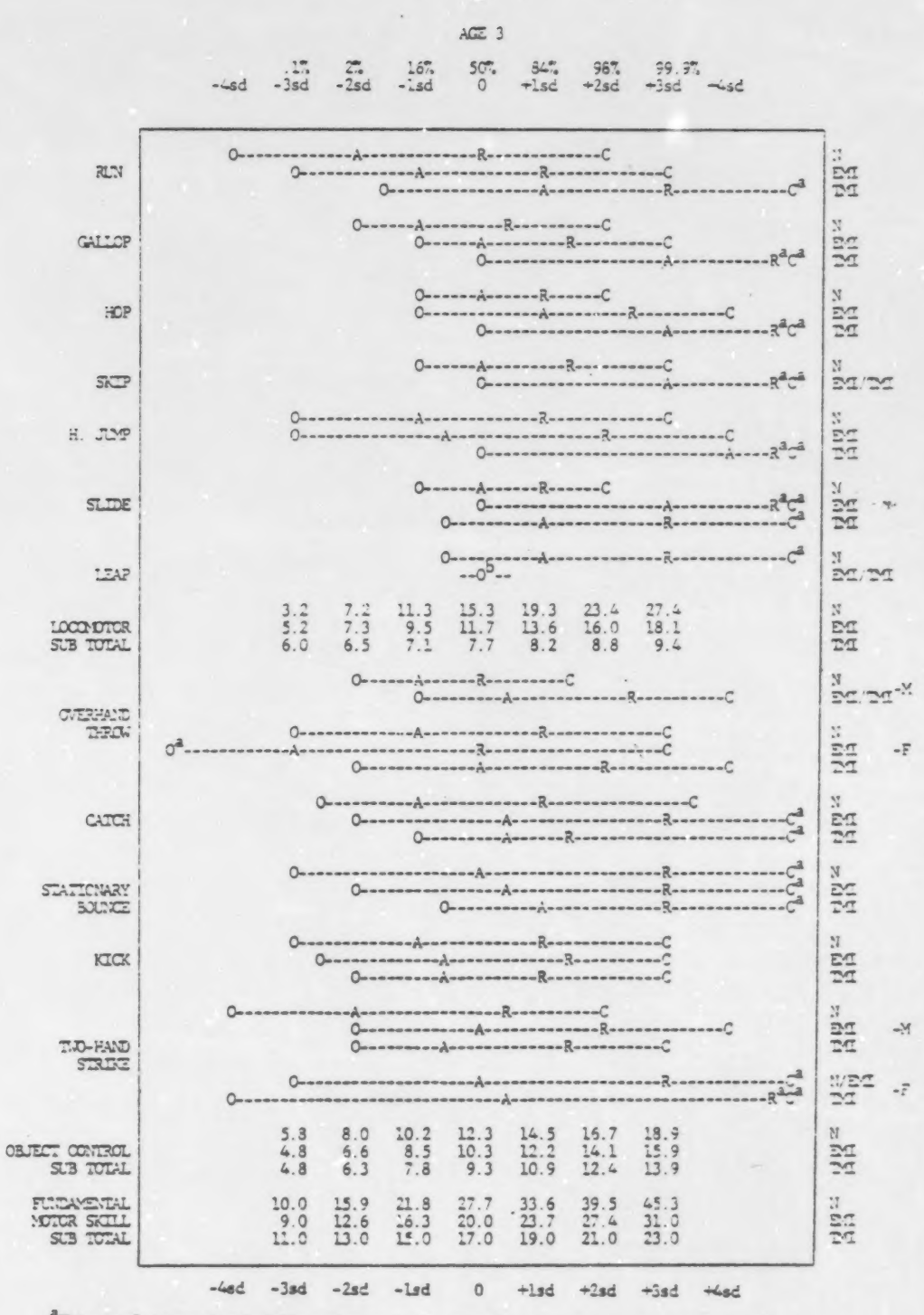


[a]This performance level falls above or below the mean by more than 4 standard deviations

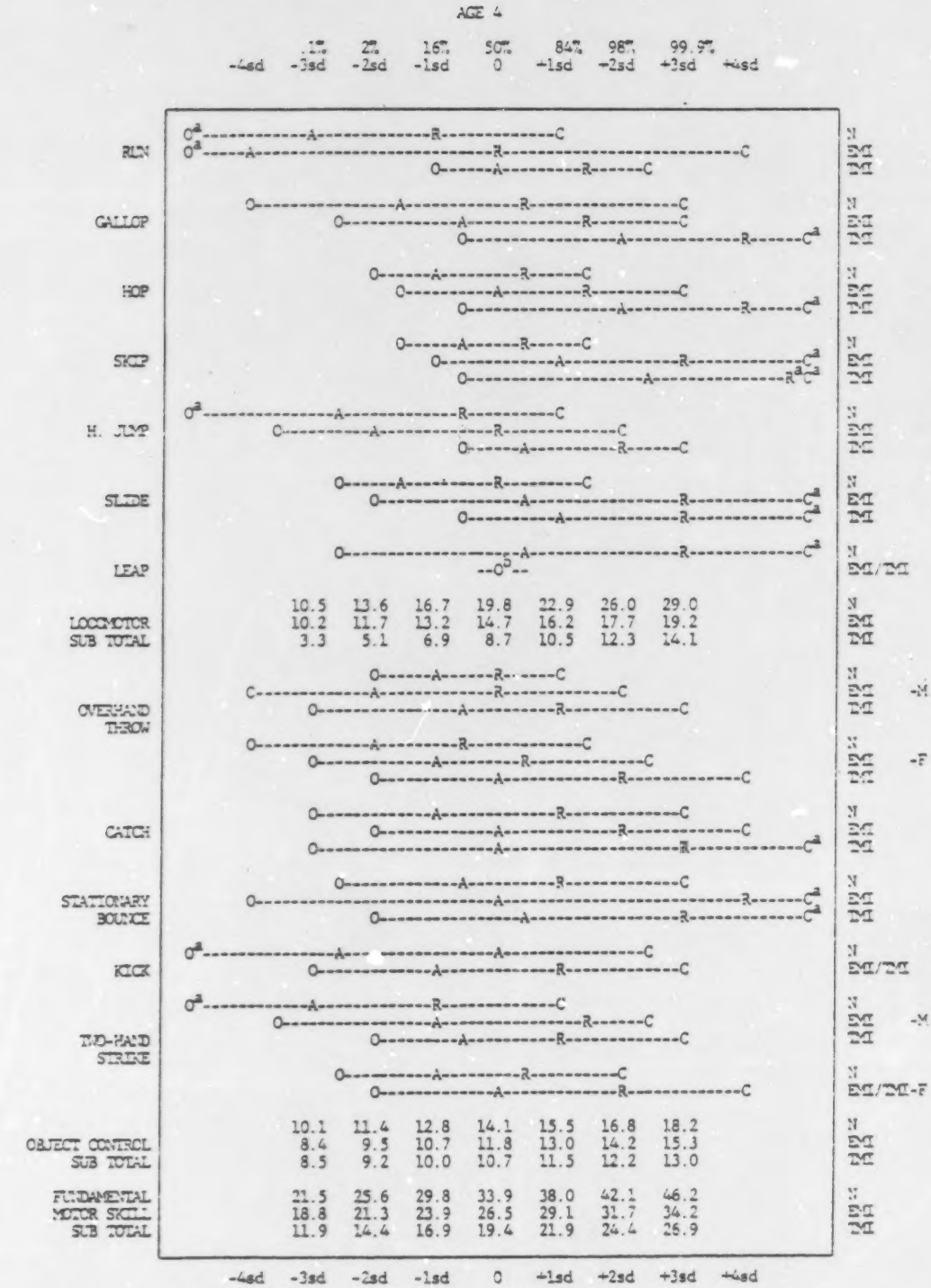


[a]This performance level falls above or below the mean by more than 4 standard deviations

STUDENT PROFILES



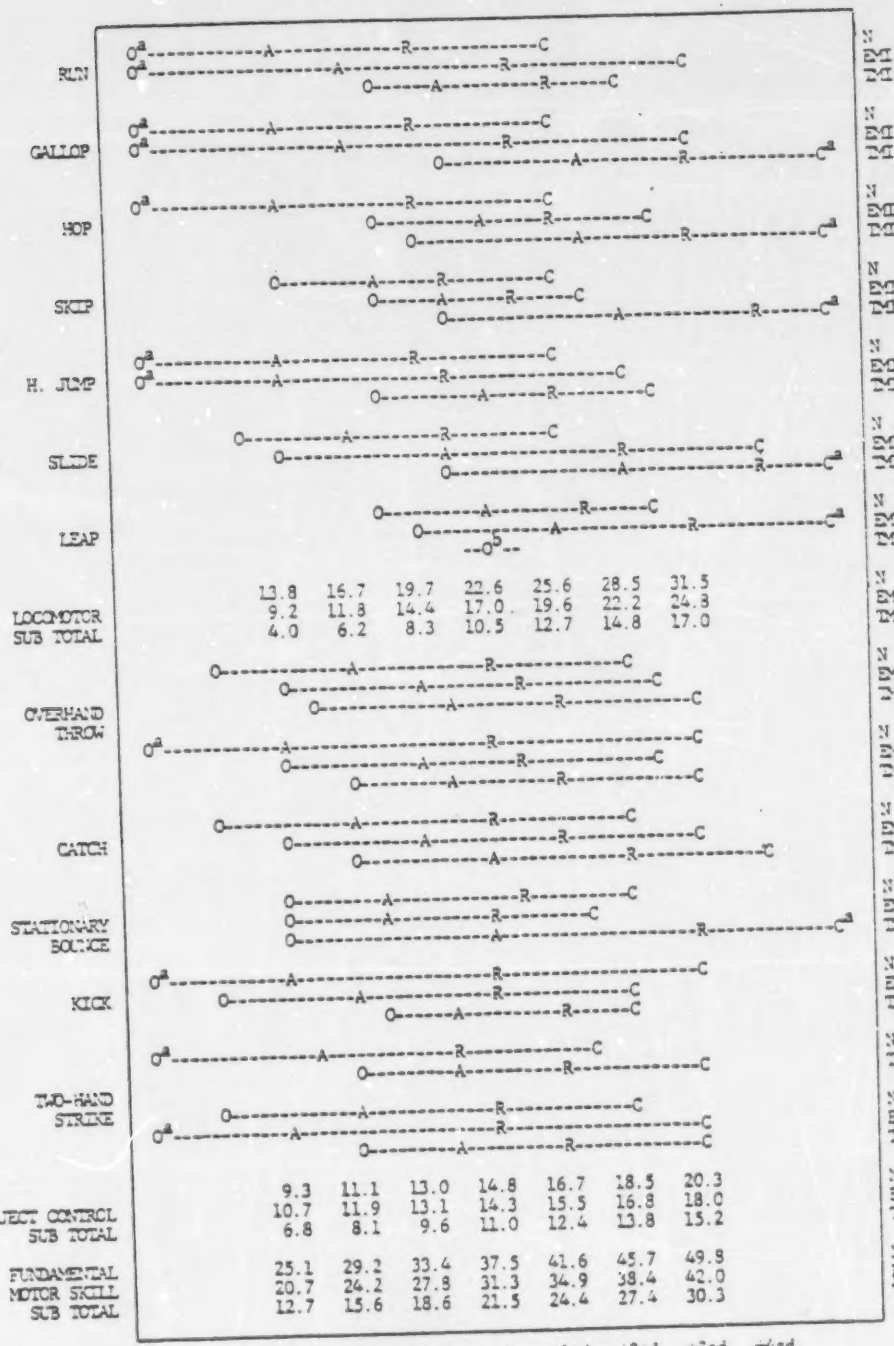
[a]This performance level falls above or below the mean by more than 4 standard deviations
[b]All students in this classification scored at this level of performance



[a]This performance level falls above or below the mean by more than 4 standard deviations
[b]All students in this classification scored at this level of performance

AGE 5

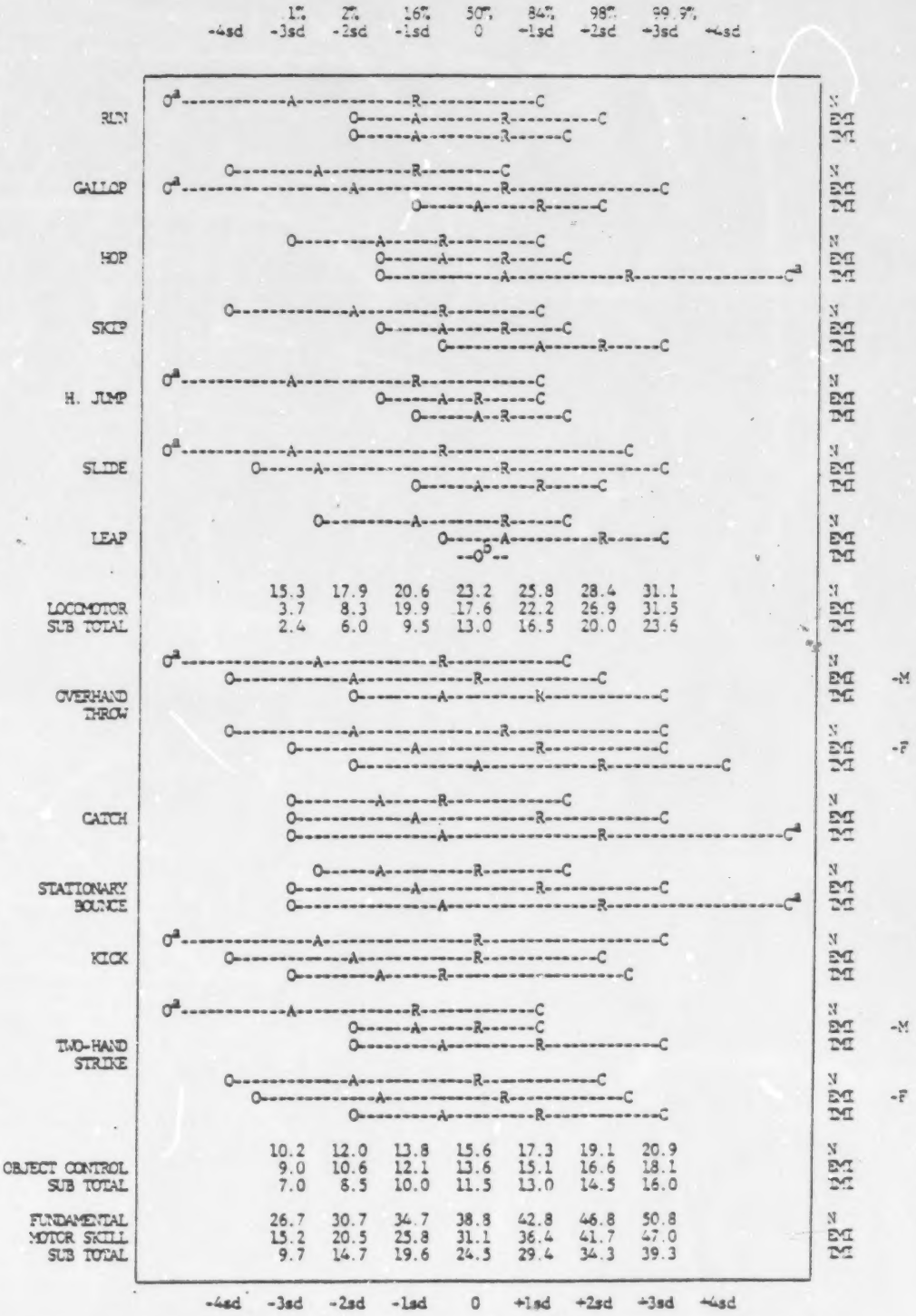
-4sd	.1% -3sd	2% -2sd	16% -1sd	50% 0	84% +1sd	98% +2sd	99.9% +3sd	+4sd



-4sd	-3sd	-2sd	-1sd	0	+1sd	+2sd	+3sd	+4sd

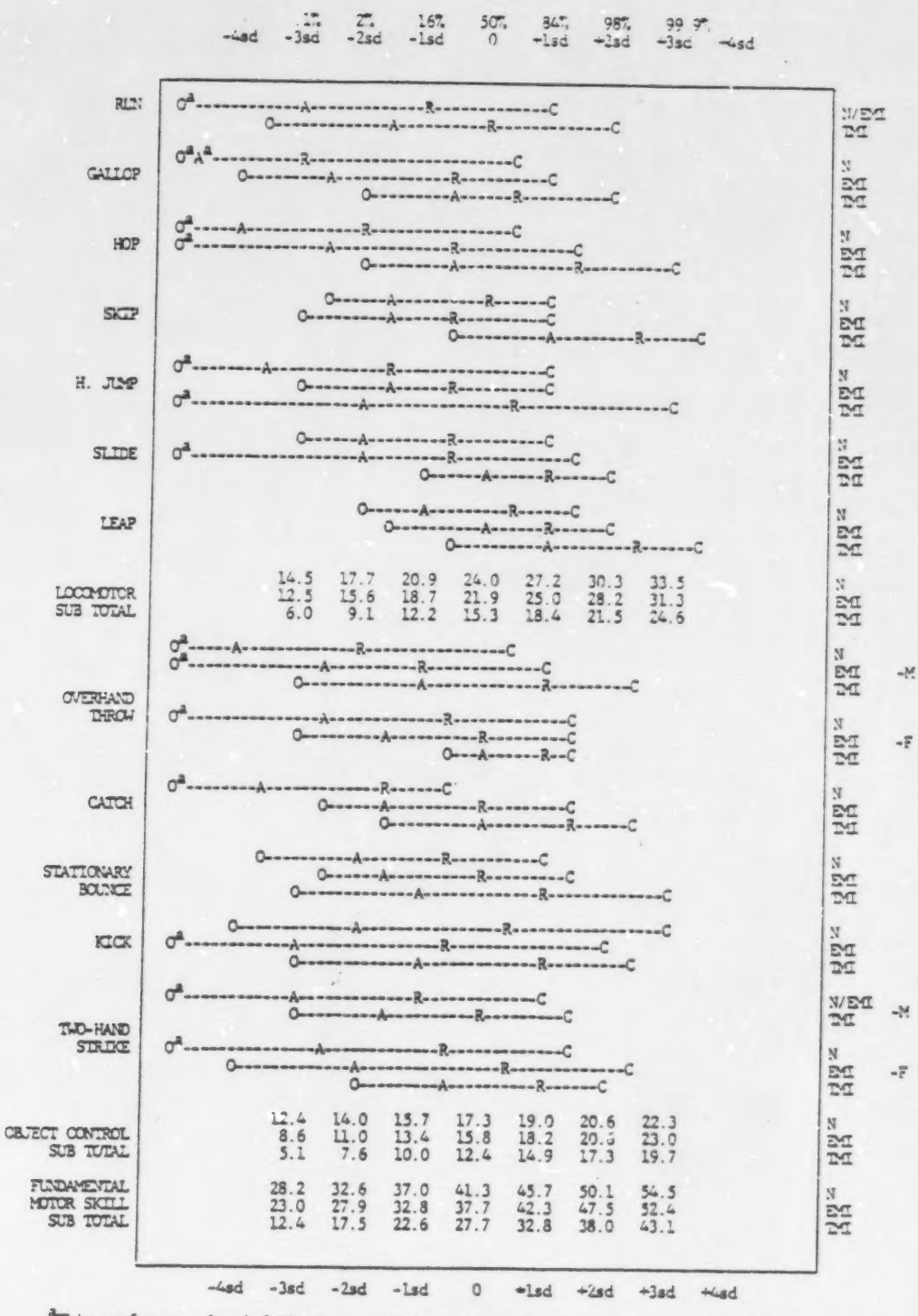
[a]This performance level falls above or below the mean by more than 4 standard deviations
[b]All students in this classification scored at this level of performance

AGE 6



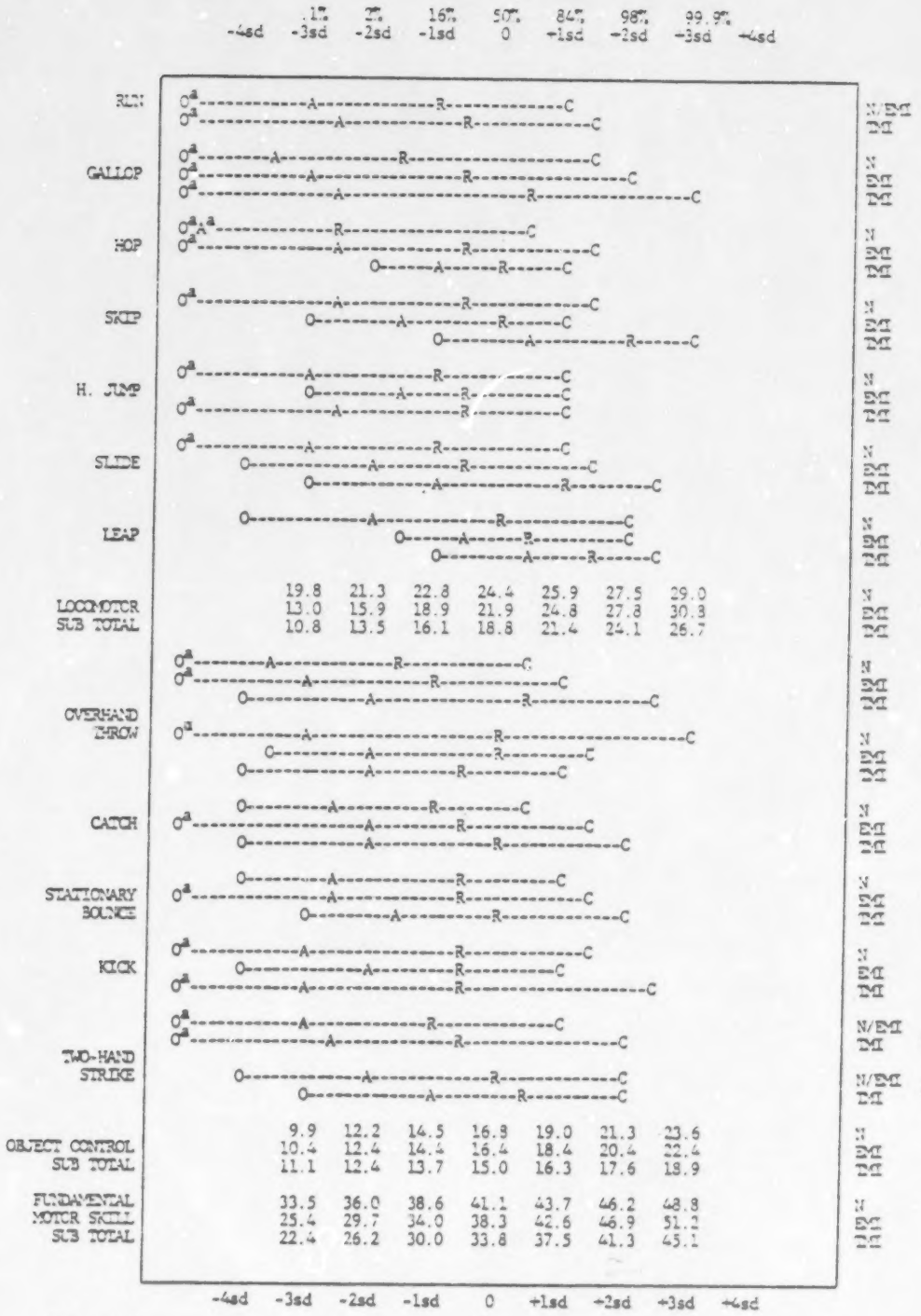
[a] This performance level falls above or below the mean by more than 4 standard deviations
[b] All students in this classification scored at this level of performance

AGE 7



[a]This performance level falls above or below the mean by more than 4 standard deviations

AGE 8



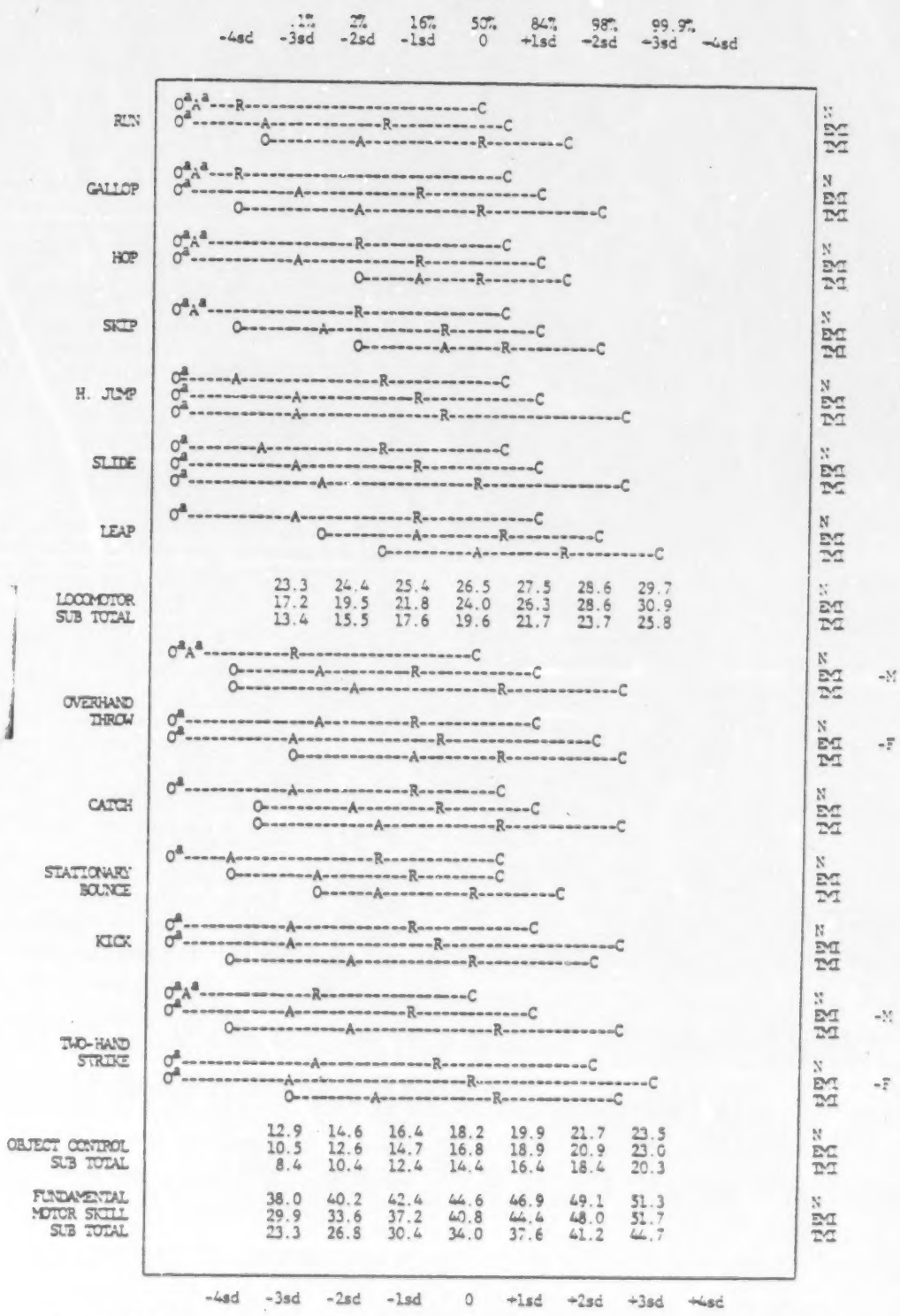
[a]This performance level falls above or below the mean by more than 4 standard deviations

AGE 8

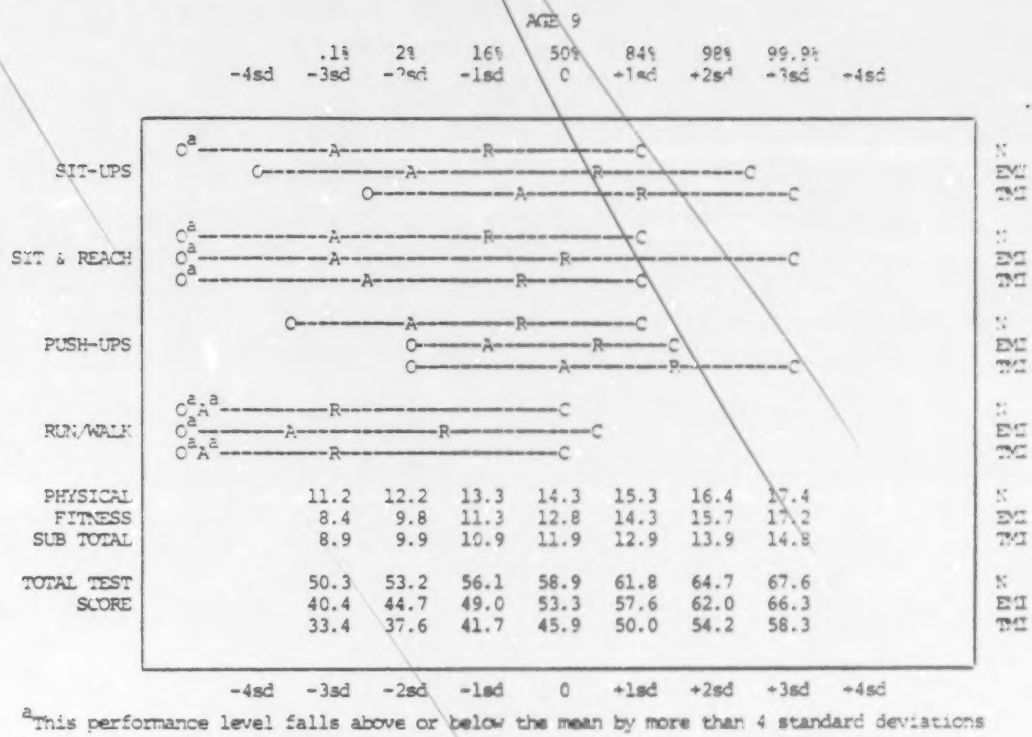
	.1%	2%	16%	50%	84%	98%	99.9%		
	-4sd	-3sd	-2sd	-1sd	0	+1sd	+2sd	+3sd	+4sd
SIT-UPS									N
									EMI
									TMI
SIT & REACH									N
									EMI
									TMI
PUSH-UPS									N
									EMI
									TMI
RUN/WALK									N
									EMI
									TMI
PHYSICAL FITNESS SUB TOTAL		8.8	10.3	11.8	13.3	14.8	16.3	17.8	N
		6.4	8.2	9.9	11.7	13.4	15.2	16.9	EMI
		5.7	7.3	8.9	10.5	12.1	13.7	15.3	TMI
TOTAL TEST SCORE		42.9	46.8	50.6	54.4	58.3	62.1	66.0	N
		33.3	38.7	44.2	49.6	55.1	60.5	66.0	EMI
		29.4	34.4	39.3	44.3	49.2	54.1	59.1	TMI

[a]This performance level falls above or below the mean by more than 4 standard deviations

AGE 9

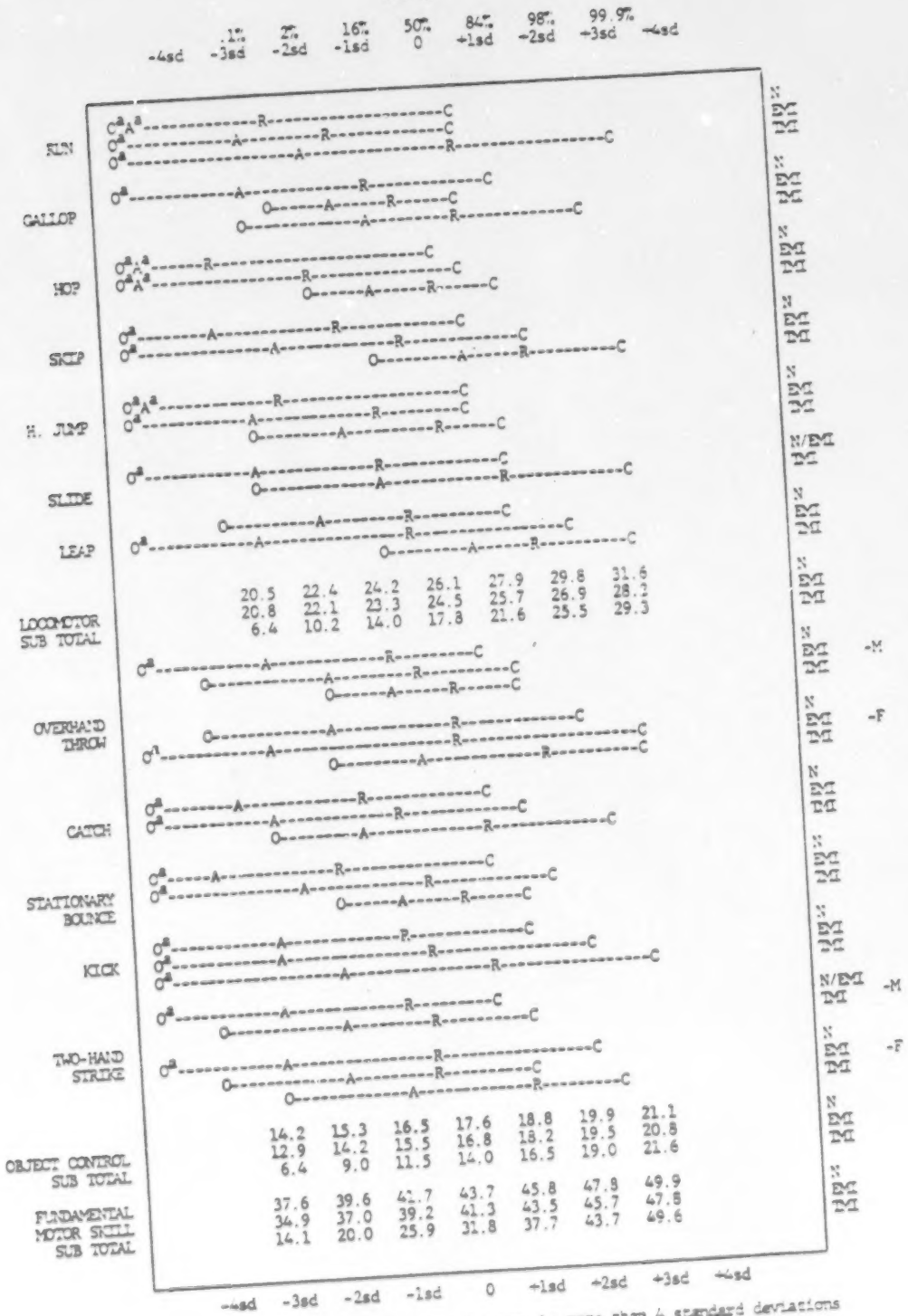


[a]This performance level falls above or below the mean by more than 4 standard deviations



[a]This performance level falls above or below the mean by more than 4 standard deviations

AGE 10



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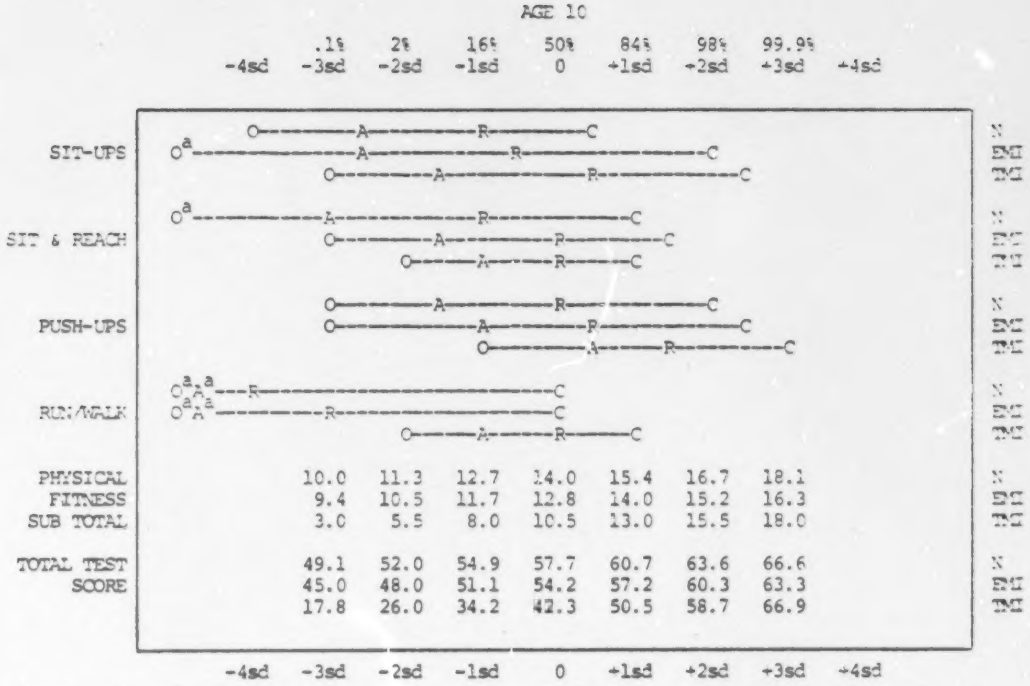
AGE 10



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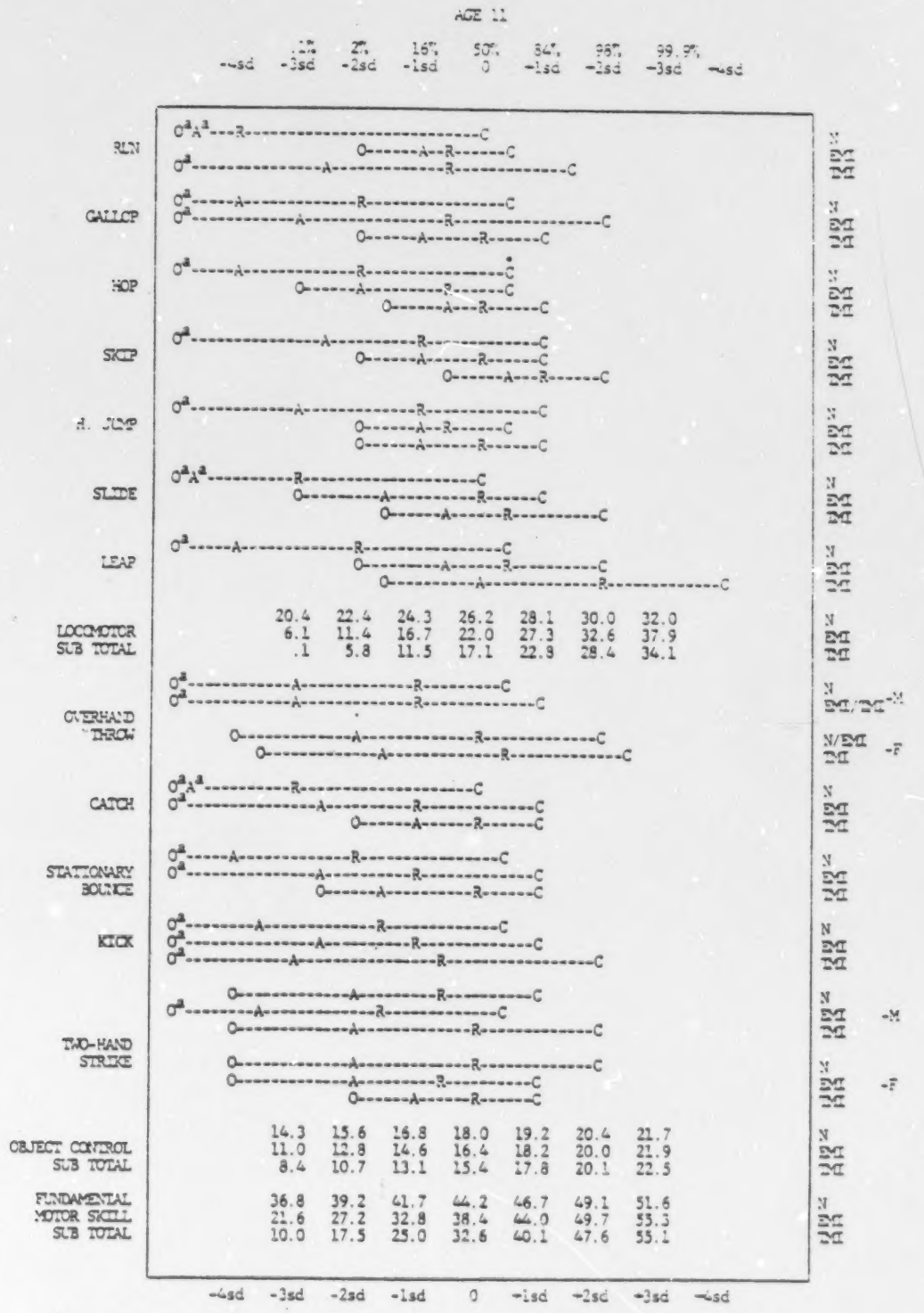

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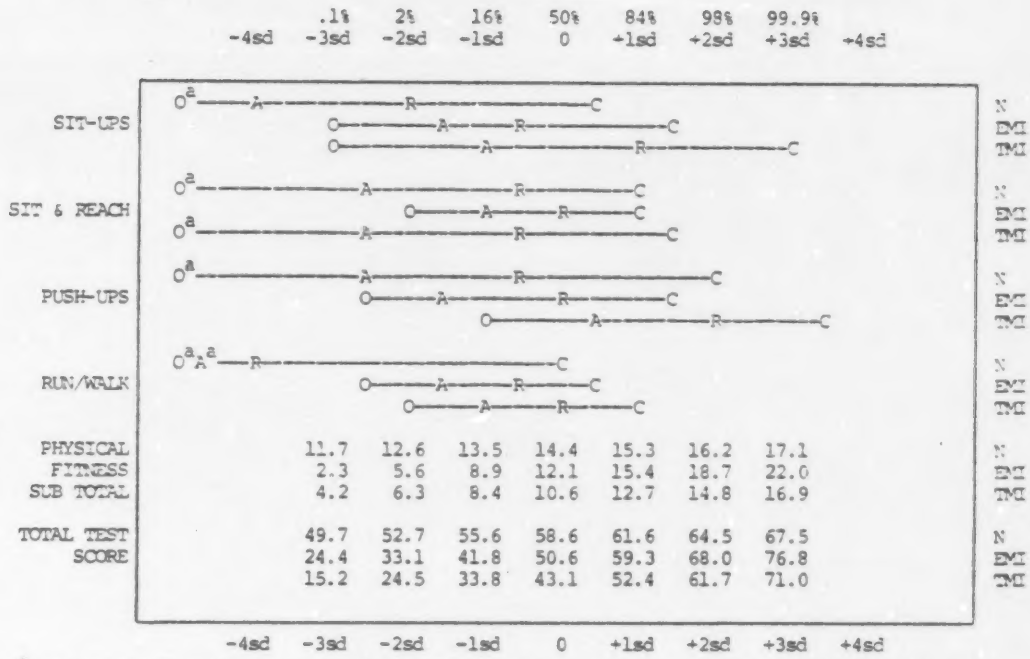
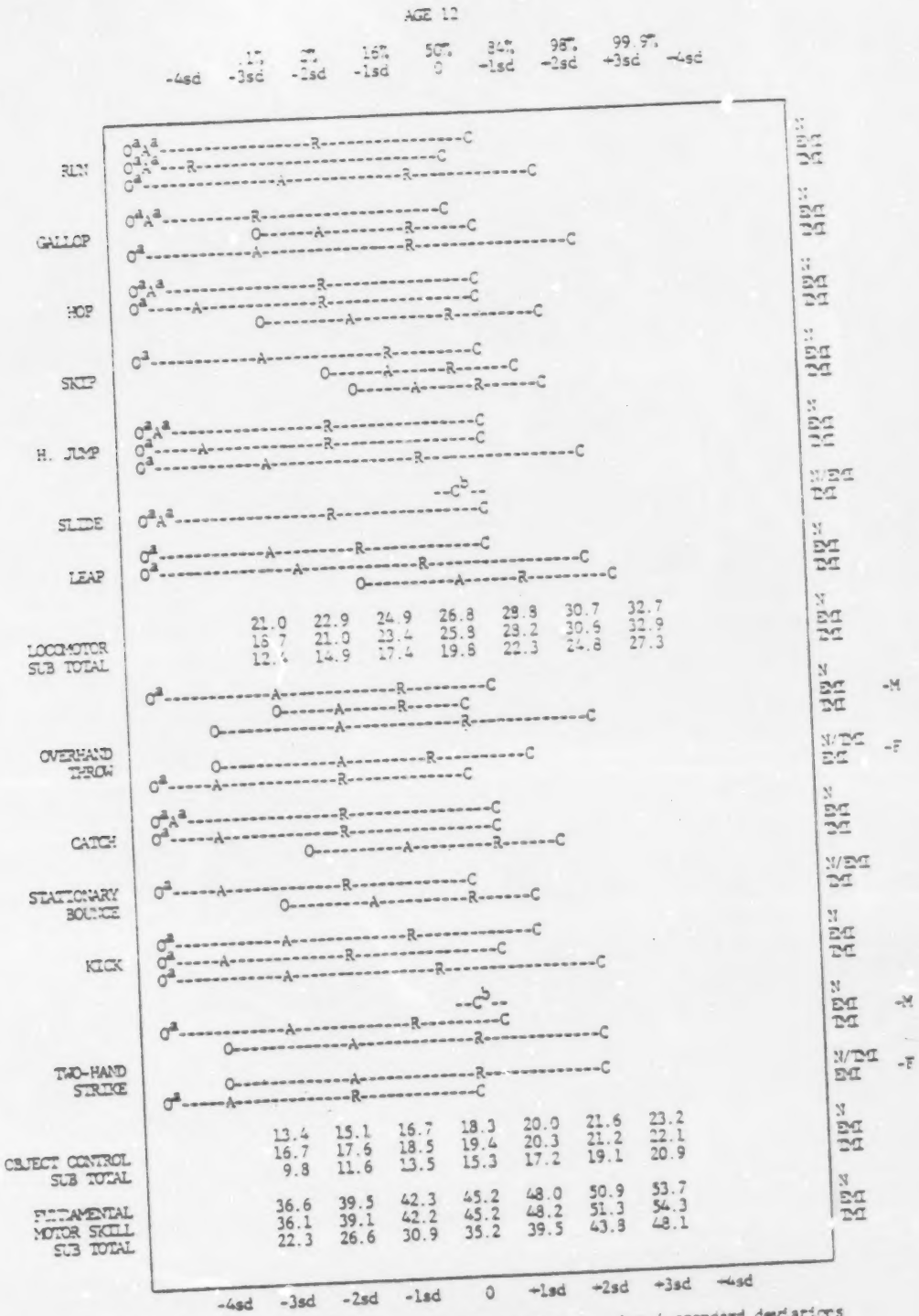
AGE 11

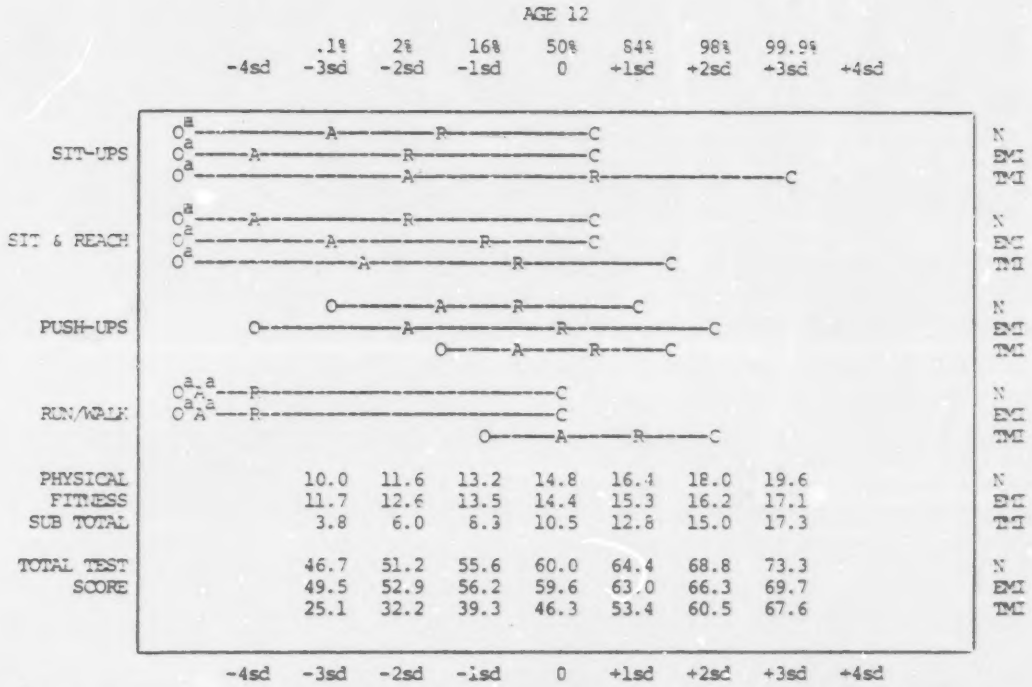


[a]This performance level falls above or below the mean by more than 4 standard deviations



[a]this performance level falls above or below the mean by more than 4 standard deviations
[b]All students in this classification scored at this level of performance

AGE 12



[a]This performance level falls above or below the mean by more than 4 standard deviations

Guidelines for Interpreting Student Profiles

1. Test item scores to the left of the line represent student weakness (or unique needs). Test item scores falling on the line or to the right represent student strengths.
2. Subtotal test scores to the left of the line represent skill area weaknesses. Subtotal test scores falling on the line or to the right represent skill area strengths.
3. Special education eligibility decisions can be made by establishing local criteria. An example of appropriate local special education criteria might be 2 standard deviations or more below the mean when compared to normal students' motor skills. It is recommended that teachers and parents use the subtotal and total test scores to make such eligibility decisions. If a student performs 2 or more standard deviations below the mean, specially designed instruction may be required.
4. Physical education placement decisions can be made by comparing a student's performance with the performance of other students in a particular class or setting. If any student, regardless of classification (assuming the student has acceptable learning characteristics), performs around the mean when compared to a

given group, then it appears that the proper placement would be with that group or class. Placement decisions can be made for units of instruction (e.g., locomotor skills, object control skills, or physical fitness skills). There is no reason why a student that performs poorly in physical fitness but around the mean for other units of instruction should be placed in a special or remedial class for all units. A student should be given as many opportunities as possible to participate in the regular education program.

5. Instructional programming decisions can be made if a local school district's physical education curriculum matches the objectives measured by this test. A precise instructional prescription can be developed based on the identification of skills that the student has not mastered. Duplication of instruction on skills that the student has already learned is not appropriate. Simply by looking at the test score sheet, a teacher can determine the student's present level of performance and select those skills that have not been mastered at the criterion level. By grouping those students together that have the same instructional needs, a teacher can plan more appropriate learning activities.

Reliability of the Test

An alpha coefficient of .92 was obtained on 140 students across all 16 test items, resulting in acceptance of inter-item homogeneity. A test-retest reliability coefficient of .97 was obtained when the test was administered on two separate occasions by three independent administrators.

Validity of the Test

A 97.6% agreement was obtained on content validity when reviewed by three independent content experts.

A perfect +1 item-objective congruency rating was obtained on all 16 test items when reviewed by three independent content experts.

Criterion-selection validity was obtained when three content experts rated the components selected for each test item on (1) their observability in the physical education class, and (2) their consistency with what research describes as a mature pattern.